March/April 2006 >> Vol.24

AEC MAGAZINE

DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT



Laser site

Architectural scale models crafted by laser

Model produced by ARRK
Design by Zaha Hadid Architects

The day the Earth stood still

When MicroStation met SketchUp on Google Earth

Master of transformation:

Chuck Hoberman on the evolution of adaptable structures

Autodesk: the next generation

AutoCAD 2007, Revit, ADT and beyond

AECMAGAZINE
DESIGN, MANAGEMENT & COLLABORATION IN THE BUILT ENVIRONMENT

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E D A
PUBLICATIONS











Graphisoft to automate revisions

Continuing to look beyond its traditional field of architectural design, Graphisoft announced Graphisoft Change Manager this month, a new workflow application targeted for the needs of construction companies, subcontractors and engineers in order to help them improve their understanding of project changes while minimising risk of errors and saving time.

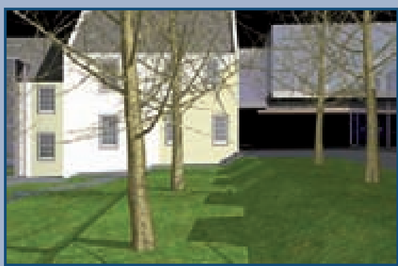
"Change management is a major issue facing today's project teams", explains Clay Freeman, VP of Graphisoft Construction Solutions. "Project teams generate frequent revisions to sets of construction documents often containing hundreds or even thousands of drawing files. Identifying and responding to changes is a time-consuming process and missing a single change can have disastrous consequences."

Continuing this focus on ironing out inefficiencies in the construction process, Graphisoft also announced the formation of a global alliance with Oracle. According to Graphisoft, the alliance will deliver solutions to the construction sector with the aim of addressing key industry issues around inefficiency, waste and the mis-management of projects. The first combined initiative from the alliance will be a UK-wide series of seminars designed to show construction executives how technology can be applied to building projects to improve efficiency on time, and on budget, delivery.

Meanwhile, following on from January's announcement that its ArchiCAD solution can seamlessly link to Tekla Structures, Graphisoft has built links with two additional structural software programs. ArchiCAD can now share Virtual Building model data with the structural design solution AxisVM, and high-end structural design and analysis solution FEM-Design.

www.graphisoft.com

NavisWorks moves design/review forward



NavisWorks has announced the release of JetStream v5, the fifth generation 3D design review software from the Sheffield-based company. JetStream v5 delivers enhancements to allow AEC project stakeholders to work more effectively together and retains the JetStream name to maintain awareness of the improved streaming technology that is designed to deliver ever better large model handling from the product's real-time engine.

This fifth release from NavisWorks includes a host of workflow and communication enhancements, enhanced file format support including an exporter for Autodesk's Revit, and IFC support for both geometry and object properties. JetStream v5 also adds an interface to allow easy access to ODBC databases for bringing through properties such as cost, shipping dates, and other specialist data to allow the 3D model to become the digital information hub. Elsewhere, JetStream v5 introduces 4D clashing to identify interferences in time, which is particularly useful in workflow planning, and improvements have also been made to the Presenter plug-in for producing highly realistic output.

www.navisworks.com

OS introduces new Pictometry technology

Ordnance Survey has introduced a new integrated system for viewing, measuring and planning the built and natural landscape. Pictometry technology combines packages of oblique and vertical aerial images with a viewing software application designed to enable accurate measurements.

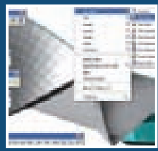
Access to multiple perspectives is particularly useful for emergency services, insurers, town planners and others requiring a detailed view of the elevation and surroundings of buildings. It enables users to see features in their entirety and visualise and measure the spatial relationships between them. According to Ordnance Survey, the system does not require any specialist knowledge.

"Pictometry is one of the first products in the world to be based on the concept of geospatial fusion," says Ordnance Survey's Senior Product Manager Stuart Pretty. "This means that it combines aerial images with a unique application, ensuring accurate measurements of features in their geographic context. Users can click on an image and pull up the underlying Ordnance Survey geographic data. This ability means they can effectively go beyond the image."

Pictometry fits well with Ordnance Survey's core datasets. It is positionally correct to the entire OS MasterMap intelligent data portfolio of Topography, Imagery, Address and Integrated Transport Network Layers. It can also be used in conjunction with Points of Interest data.

www.ordnancesurvey.co.uk

3D and lisp for AutoCAD LT



GlobalCAD has announced the release of Toolbox LT 2006, a productivity solution that claims to add 3D modelling and LISP support to AutoCAD LT. Toolbox LT is designed to provide a cost effective solution for extending the design and drafting capabilities of AutoCAD LT. Now architects and engineers can design in 3D with solids and surface modelling, generate realistic shaded renders, import and manipulate graphic images and load and run Lisp utilities and ARX applications, says it developers.

www.globalcad.com

ISS re-brands to Robobat UK

Integrated Structural Software (ISS), the UK subsidiary of Robobat and distributor of Robot Millennium, has changed its name to Robobat (UK) as part of a company re-branding. Robot Millennium is a Finite Element Analysis (FEA) and design package designed primarily for the Structural Engineering and Civil Engineering professions.

www.robobat.co.uk

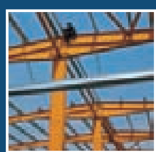
Nvidia gives mobile options



Nvidia has shown just how seriously it is taking the professional mobile graphics market by introducing three new Quadro FX graphics chips. The new line-up includes: the Quadro FX 350M, the company's first professional GPU designed specifically for thin and light mobile workstations; the Quadro FX 1500M, which looks set to be the company's volume mobile workstation solution; and the Quadro FX 2500M, which is designed to deliver top end performance with 512MB memory, but at expense of battery life.

www.nvidia.com

Structural market survey



Leading IT consultancy, Cambashi, has announced the start of a Web-based survey of the structural engineering community. As the construction industry wrestles with both the shift from 2D to 3D CAD and the newly-instigated Eurocodes, this research investigates the extent to which today's engineering software meets industry's needs. The survey can be found at

www.cambashi.com

AEC Magazine's new online presence:

www.aecmag.com

Key practice adopts Revit



Following the merger between Aukett and Fitzroy Robinson, the new combined architectural practice AukettFitzroyRobinson has chosen to standardise on Autodesk Revit Series. As a result, it has ordered 74 seats from Autodesk reseller Excitech for immediate implementation with an option to take another 40 to replace Bentley MicroStation systems in the near future.

www.autodesk.co.uk / www.excitech.co.uk

KIP launches the KIP3000

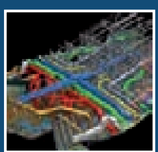


KIP UK, the provider of wide-format digital reprographic systems, has launched the KIP 3000, a new Multi Function Print system (MFP) that enables digital copying, scanning and printing for decentralised print environments. The KIP3000 features a small footprint and includes a cost accounting capability accessible through a touch screen interface. ***www.kipuk.com***

Remote 3D rendering

A new company, Render Nation, spun out of the AIMES Centre at the University of Liverpool, is providing on-demand access to high-powered rendering facilities that may have previously been out of the reach of smaller animation, design, and architectural companies. Its facilities, which are supported by the grid computing utility model at AIMES are accessed through a web application which enables customers to submit work and retrieve completed projects. ***www.rendernation.com***

Virtual Building Solution



Digital Project, a next-generation software platform that is designed to turn the Virtual Building concept into a reality is now available in the UK. Virtual Building, pioneered by Arup and Gehry Technologies, allows design, construction and operational problems to be visualised and solved using computer simulation. CenitDesktop is partnering with Arup to implement the solution in the UK and drive the Virtual Building concept, which simulates design, engineering, analysis, fabrication, project management and on site construction activities within the solution.

www.cenitdesktop.com

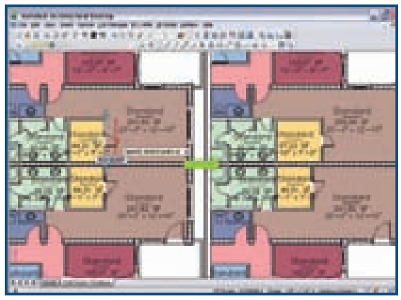
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Autodesk updates CAD portfolio

You know Spring is coming when Autodesk updates its entire portfolio of products and this year was no different with the company announcing new releases of AutoCAD and AutoCAD LT, and unveiling a new generation of building, geospatial and civil engineering solutions.

AutoCAD 2007 will all be about 3D, conceptual design and presentation, and introduces a range of new solid and surface modelling tools. Many users will also be pleased to learn that Autodesk has finally introduced the ability to publish to Adobe's PDF file format.

In the Building solutions division, Autodesk announced the availability of Revit Building 9, Architectural Desktop 2007 (pictured), Autodesk Building Systems 2007 and Autodesk VIZ 2007. Revit Structure 3, which will officially be made available in the UK for the first time, and Revit Systems Plus for mechanical/electrical/plumbing (MEP) engineering, will follow shortly.



For the infrastructure market, Autodesk Civil 3D 2007, Autodesk Map 3D 2007, and Autodesk Raster Design 2007 will continue to push the integration of CAD and geospatial information systems (GIS). More info on the new products can be found on page 11.

www.autodesk.co.uk

SketchUp is Googled!

In a move that sent quite a few ripples through the CAD industry when it was announced last month, Google, the online search giant, has acquired @Last Software, the developer of the popular drag and drop conceptual design tool, SketchUp. @Last and Google had been cooperating for some time on the SketchUp plug-in for Google Earth, so some have seen this deal as a natural progression of this relationship. Indeed, since the plug in was announced last Autumn, SketchUp users have added numerous buildings to Google Earth. While Google's exact plans for SketchUp have not yet been announced, the deal is sure to open SketchUp up to whole new community of users, while its developers have assured its current user base that the product will continue to be developed in its own right.

At the same time (literally on the same day) Bentley announced support for Google Earth with the ability to publish both 2D and 3D data to end-user created Google Earth maps with its forthcoming MicroStation XM software.

More details on both announcements can be found on page 15. ***www.google.com / www.sketchup.com***

Report shows increase in UK AEC CAD managers

A new report examining the CAD Manager's role in the UK Architectural Engineering and Construction industry has been released by the Evolve Consultancy. The on-line study held over the past few months aims to highlight the common tasks those with a responsibility for CAD undertake, what is important, what is not and the challenges faced. The survey attracted a wide range of responses, from CAD Technicians with some responsibility for CAD support through architects and engineers to full-time, dedicated CAD Managers.

The report shows some noticeable trends since the last study, carried out in 2004 including a greater number of full-time CAD Managers; more companies using of BIM; most support calls cover the same topics: data translation, printing and lack of training; the increased use of a recognised CAD standard; and a lack of investment in training.

A full copy of the report and the conclusions can be downloaded from ***www.eatyourcad.com***

DisToPlan looks to automate AutoCAD surveys

Latimer CAD has introduced a new product called DisToPlan, which is designed to automate the process of transferring Disto measurements directly into AutoCAD. Disto is a laser meter from Leica used by architects and engineers for the precise measurement of distances, areas and volumes. DisToPlan was developed with the help of Latimer CAD's existing TheoLt users, who utilise total-station coordinates to get survey data into AutoCAD.

"Customers will be impressed by the ability to transfer building surveys to them shortly after leaving the site," said Mark Latimer, Latimer CAD. "This is because ninety percent of the drawing will have been completed before the surveyor gets back to the office. And with only a small amount of clean up, the drawings are ready."

DisToPlan has been made possible by the introduction of Bluetooth Distos. It employs a laptop or tablet PC running AutoCAD. The product is priced at £795 for software only or as an introductory offer, £995 with a Bluetooth-enabled Disto. ***www.latimer-cad.com***



3Dlabs leaves workstations



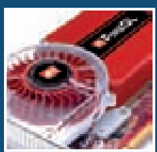
Creative Technology's 3Dlabs subsidiary is to pull out of the professional workstation graphics business and refocus its 3D graphics business on the portable handheld device market, the company announced this month. 3Dlabs had been at the forefront of professional graphics for many years with its Wildcat product family. However, fierce competition from ATI and Nvidia in recent years had made it increasingly hard for 3Dlabs to compete on performance and price. ***www.3dlabs.com***

CAD2 goes mobile



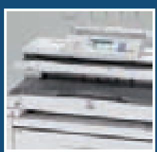
CAD2 has announced the release of its eagerly awaited certified mobile laptop workstation. Packed with features and powered by the latest Intel Pentium M Processors (up to 2.26GHz) the high performance mobile CAD workstation features Nvidia's Quadro FX Go 1400 256MB Professional Graphics Card, up to 2GB DDR-2 memory and a 17" Widescreen LCD Display. ***www.cad2.com***

ATI breaks 1GB barrier



ATI has upped the ante in professional graphics by introducing a card which features 1GB of memory. The 1GB FireGL V7350 is joined by the 512MB FireGL V7300 to spearhead the company's second wave of PCI Express professional graphics cards. ***www.ati.com***

Ricoh boosts WF range



Ricoh UK has launched its fastest wide format device to date. The Aficio 480W is capable of producing six metres per minute at 600dpi and its small foot-print makes it ideal for any design or print environment with limited space, the company claims. Fully integrated with industry standard packages, including AutoCAD, Bentley MicroStation and Windows, the Aficio 480W provides high-quality scanning up to 256 grey scales. With paper stocks ranging from A4 to A0, it can also accommodate up to four paper rolls or two rolls plus two cassettes. The Aficio 480W is available now priced at £18,995. ***www.ricoh.co.uk***

Engineering software sales rise

Cambashi, the engineering IT industry analysis and market research consultancy, has published the results of its annual survey of the worldwide engineering software market. It shows investments in new engineering applications software by engineering and manufacturing firms worldwide increasing by some 7% in 2006.

The report, which covers the North America, Europe/Middle East/Africa (EMEA) and Asia/Pacific regions, describes the survey's findings on past and future investments in the two main categories of engineering software that it tracks, i.e. MCAD/PLM software and AEC software. According to Cambashi's findings, investment in engineering applications software across all sectors has been on an upward trend since 2002. This trend looks as if it will continue throughout 2006.

In 2002, total worldwide investments in engineering software, as measured by vendor revenues and expressed in $US, was $5 billion. With an approximate 14% increase in investments in each of the following two years, this investment figure grew to an estimated $6.8 billion in 2005. Cambashi's forecast for 2006 shows a further increase, albeit at a lower overall rate of 7%, to $7.4 billion.

The report also shows that while increases in investments were fairly uniform across the three regions in 2004, clear differences had begun to emerge by 2005. These differences look set to continue in 2006, with an 11% increase forecast for the Asia/Pacific region, compared with a 7% increase in EMEA and 6% in North America. At the same time, while the Asia/Pacific region currently accounts for just 21% of the worldwide engineering applications software market, this proportion has increased by 2% over the past five years and looks set to continue increasing in the near to mid-term future.

A full copy of the Cambashi World-Wide Engineering Applications Market Summary is available, free of charge on Cambashi's Web site. ***www.cambashi.com***

Oce showcases print family at Open House



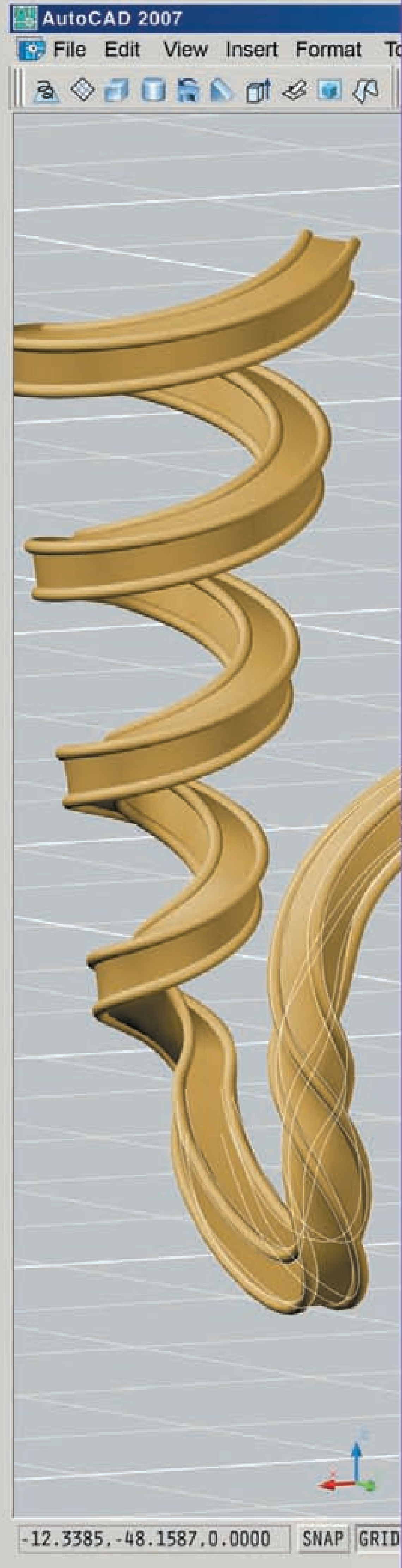
Despite the continual talk of moves to a paperless design environment, printing is still a hugely important issue and there are costs to be cut, delays to be eliminated and quality to be improved through the correct choice of printer. There was plenty of evidence of this on view at Océ OpenHouse 2006. Held in the company's factory in Poing, Germany from 27th to 29th March, this single-vendor event is claimed as Europe's largest annual digital printing fair attracting 7,000 visitors. Much of the floor space was dedicated to commercial, corporate and graphics art printing. AEC and Manufacturing did get a look in, though, with the TDS320 and TDS450 monochrome wide format devices and the TCS300 and TCS500 wide format colour systems. I can see these devices being of great interest to large architectural practices, construction contractors and manufacturing companies and Océ was at great pains to show the cost-effectiveness of these devices in high-volume applications. However, for me, I think the most relevant printers were the CS2024 and CS2044 wide format colour printers (pictured). Suitable for the smaller architectural practices and manufacturing companies, these devices produce high quality colour and mono output up to 24" and 44" wide respectively and provide genuine competition for HP's wide format devices. Worth a detailed look, that's certain. *by John Marchant, SkilStream*. ***www.oce.com***

HP unveils multifunctional device at HOK

HP recently launched its new large format HP DesignjJet 4500mfp with stacker at the London headquarters of international architects, HOK. The multifunctional machine features the HP Designjet 4500 printer, which has a print width of up to 1,067mm and outputs a resolution of up to 2400x1200 dpi. It also has two integrated media rolls with long roll support up to 175 metres, and ink supplies of up to 400ml for CMY and 775ml for Black. The mfp version includes an embedded RIP, and sports the HP Designjet 4500 Scanner, and a 15" LCD touch-screen display.

The embedded software allows the user to preview, copy, enlarge, reduce or adjust colours and settings for perfecting even the originals and offers a nesting option to reduce wastage and save costs. The user can also make enlargements easily with the panelling option and track output using the integrated accounting features.

New to the HP Designjet range is the HP Designjet 4500 Stacker, which comes as an option to the Designjet 4500 and 4500mfp. It automatically flattens and stacks up to 200 A1 or A0 size prints and when combined with the printer, can produce 200 plots, printed and stacked in four hours without any user intervention. ***www.hp.com/designjet***


AutoCAD 2007
File Edit View Insert Format
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SNAP
GRID



Autodesk's 2007 AEC products

Autodesk's yearly release event is upon us. March/April appears to be the regular time that Autodesk launches hundreds of products, from AutoCAD LT through to Revit and the growing number of discipline-specific design tools.

Martyn Day

Over the past four years Autodesk has altered its business model considerably. From delivering a release every 18 months or so, with users upgrading (on average) every other release, to Autodesk delivering a release every year and customers paying a yearly subscription. The transition to subscription isn't yet fully complete but Autodesk has also architected the price list to make subscription the lowest-cost way to own and maintain its products. Even if the software stays on the shelf and you still opt to use every other release, subscription will provide financial saving (unless you have exceedingly expensive storage space). Of course, for rapidly developing products like Revit, subscription is mandatory.

The downside is that Autodesk is 'obiting' AutoCAD releases faster than it ever has done in the past. AutoCAD 2002 was retired last month and AutoCAD 2004 is next to go; we are just waiting for a date of execution (typically this has been around January). The issue here is that by staying on a release the cost of upgrade increases over time to a point where a whole new copy has to be bought as 'obited' versions of AutoCAD can not be upgraded. That is, unless Autodesk comes up with a time limited upgrade offer.

The crux of this business model is that Autodesk delivers new features and functions every year, its customers see the value in what they are getting, hopefully use the new technology and don't mind paying for next years subscription. To date this seems to have worked well, with Autodesk claiming over 90% retention of subscription customers and I have been impressed with the quality and innovation that Autodesk's development teams have demonstrated. The question is, have they managed to maintain it for this year's batch of releases?

AutoCAD 2007 and LT

It's still the industry standard and king of the 2D CAD systems. AutoCAD 2007 really does bring in some big changes, especially in 3D functionality. While this may not prove to be that popular with traditional AutoCAD users, I have to say it's damn cool from a pure technology perspective. (A bigger review of 2007 will be run in the next edition). The interface has come in for a considerable update, called Dashboard but don't fear, you can opt to have it or the 'classic' style.

Forgetting 3D for a minute, Autodesk has slightly improved AutoCAD's 2D draughting tools. The Express Tools that were an add-on utility last time around have been built-in, providing powerful Layer Management tools. If you had the last release you already had these but had to load them up separately. There's a powerful Dynamic Block authoring component to make the creation of dynamic blocks easier (a feature which was added with the last release but one that hasn't been used by many customers). DWFs can be brought in as underlays, PDF out is finally built-in and Autodesk has enabled AutoCAD to warn users if a DWG file was created in a non-Autodesk product. This is perhaps a bit 'big brother', in that competitor's products all write reverse-engineered DWGs but Autodesk claims that most corruption comes from these non-Autodesk DWG files.

Talking of reverse engineered file formats, Autodesk is doing its own version of Bentley MicroStation DGN (2D only V8), which was slated for release in 2007. It looks like this will now be added later in the year, as it requires more beta testing. The DGN functionality will not be available for LT customers.

Back on the DWG vibe, and in 2007 the format changes, causing all those usual headaches. Autodesk has tried to mitigate this by enabling AutoCAD 2007 to save back to the popular R14 format and has included a conversion utility called DWG TrueConvert. If you are a subscription customer you also get access to Vault, an easy-to-use document management tool that has previously been available with Inventor, Autodesk's key mechanical design solution.

There are some handy migration tools and a manual (these have become so rare that it's worth a mention), which covers the new 3D functionality.

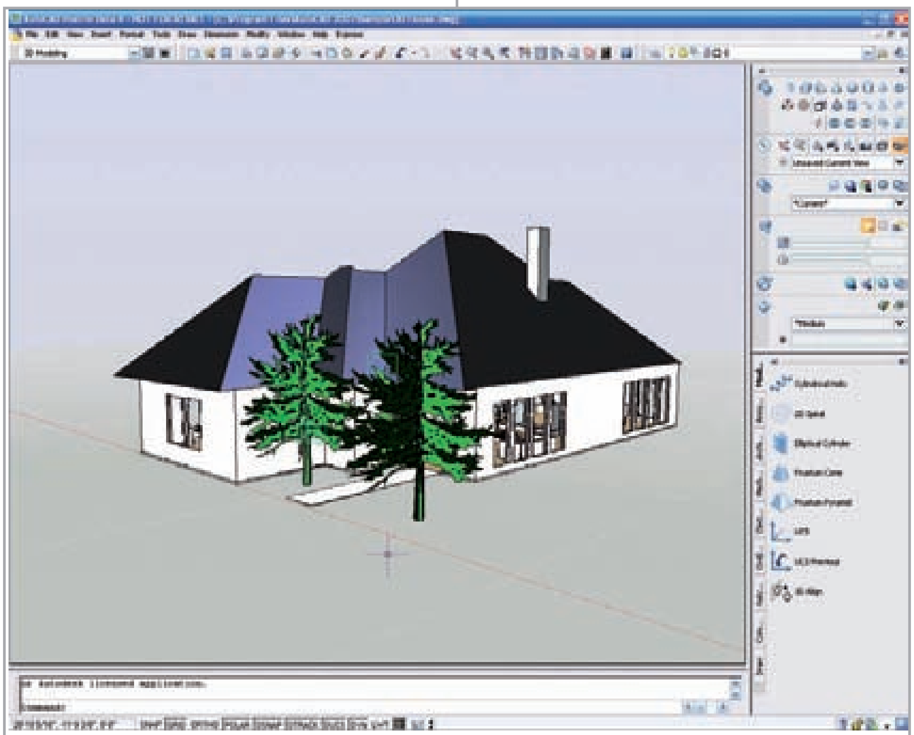
Before getting 'all 3D' on you, it's worth point out that the gap between AutoCAD and AutoCAD LT gets wider. Now AutoCAD LT does not offer the following features of its big brother:

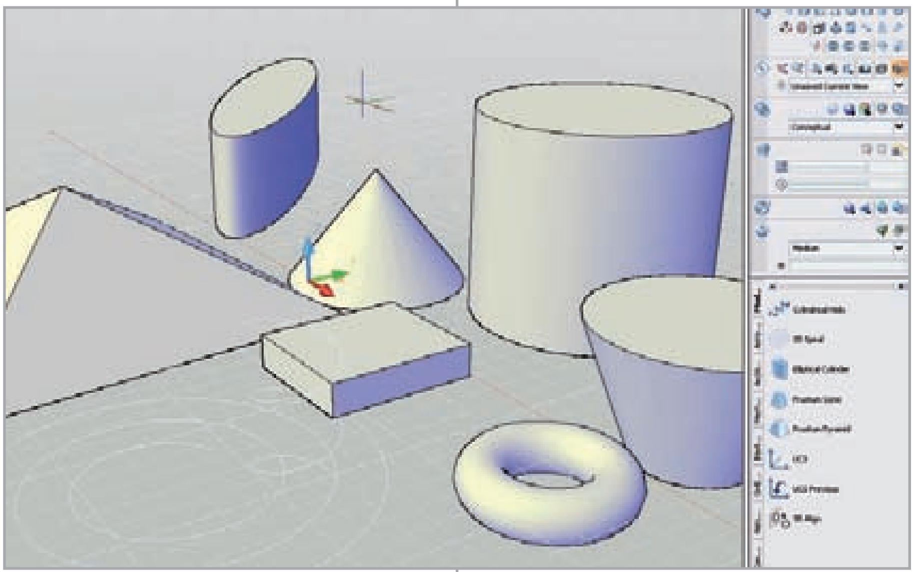
- Conceptual Tools
- Drawing Set Management
- Customisation
- Presentation Graphics
- CAD Standards Management
- Attribute data extraction
- Network licensing

3D is the main event of AutoCAD 2007 and the product has received some inspiration from 3D Studio Max, Viz and Sketch-Up. Let's face it, in the past AutoCAD was a pig to work with in 3D. The new interface offers a gridded plane, fast graphics, powerful 3D commands and a wealth of real-time shading options – it's a revolution for AutoCAD. However, 3D does come at a cost and a typical low-power 2D machine may struggle. As AutoCAD installs it checks your machine's ability to perform in 3D and will alert you to any shortcomings. The most common stumbling block is likely to be graphics. Here, AutoCAD will tell you if you are using a graphics card which is not certified, and therefore fully supported.

AutoCAD 2007's 3D features are described as 'Conceptual tools' and you can produce solids and surfaces, freeform curves, helixes, surface lofts, sweeps, revolves and add thickness to entities. The old UCS issues have been easily removed and UCS can be set by just selecting a face. Shapes can be edited with grips and face/edges or vertices can be 'pulled' or pushed. This is powerful and easy to use. As a result, it's now easier for a newcomer to pick up AutoCAD and model a design in 3D »

3D is the main event of AutoCAD 2007 and the product has received some inspiration from 3D Studio Max, Viz and the popular conceptual design tool, Sketch-Up.





than to learn AutoCAD's 2D features to generate a plan.

For presentation and creative types, there are some interesting rendering styles. Lines can be made to look hand drawn, objects can be made transparent and there are even real-time shadows. Walkthroughs can be quickly generated and movies made, as well as easy to use photo-realistic rendering stills.

The geometry can also be taken off as 2D and used as the start point for detail documentation of your design. To enable this it's easy to slice through the model with section cuts with hatch patterns and 'flatten' a 3D project to 2D views. The 3D models can also be used taken into products such as Revit Building and Inventor.

To sum up the release, Autodesk has done great things with the 3D side of the product. Not only is AutoCAD now a powerful modelling tool but it actually feels fun to use. The 2D side has a few crowd pleasers in there, like PDF but by release to release standards, 2007 has relatively slim pickings. I think 2007 will be seen as an important release in years to come but might have many 2D users wondering what they are getting for their subscription money. There are rumours of price increases on certain products and subscriptions but details were not available at the time of going to press.

Architectural flavours

Autodesk dominates the UK architectural market, mainly with Architectural Desktop (ADT), which has improved greatly over the last few incarnations. However, at the launch of this year's suite of updates, it was Revit and the vertical discipline versions of Revit that came out centre stage. The message from Autodesk was that Building Information Modelling (BIM) was rapidly accelerating with the Revit base up 150% over last year, and customers are now buying in bulk, with a number of 70+ seat installations.

About two years ago there were 190 Revit-using firms, so 150% growth is explainable starting from that level, especially as Autodesk refuses to give out exact numbers of Revit users. It is true to say that Revit is seeing some acceptance in larger practices now, which avoided it in the early days but Revit has a long, long way to go to compete with ADT's 440,000 world-wide installed base (a figure which Autodesk is happy to reveal).

Autodesk is also seeing good traction with the Building Systems flavour for AutoCAD, together with Buzzsaw, the company's online document distribution and project hosting portal. Viz 2007 was also unleashed somewhere but it seems to have been neglected in the marketing department.

Revit 9

Revit is now a family of products for the multi-disciplinary practice. There's Revit Building for Architects, Revit Structure for structural modelling (and 3rd party analysis) and Revit Systems, for mechanical, electrical, and plumbing, or building services. The main issue here is that Revit gets released first in the US with imperial content and the rest of the world has to wait until metric content is created. Revit Structure has only just been released in the UK, while there have been three releases in the US. For Revit Systems, a brand new product, Autodesk has chosen to launch straight into the UK at Release 1, where users can create their own objects, while Autodesk develops its own European content for the next 'official' UK release.

New features in Revit 9 Building include Sun Studies, a new comprehensive Detail Library, Material takeoff, keynoting and enhanced IFC import and export. It's possible to now import 3D models from the popular (non-Autodesk), Sketch-up conceptual modeller and turn the surfaces into Revit walls and objects.

Autodesk continues to add 'big' functionality to Revit and this release both increases the breadth of tools as well as enhancing existing features, with an eye on the additional Revit flavours. For instance when defining a room, you can now specify a room height and this data is of immediate use to Revit Structure and Revit Systems.

Autodesk looks to provide a pretty comprehensive BIM solution next year as these products become localised and receive another round of enhancements.

Architectural Desktop

The architectural workhorse gets a number of new features. Perhaps the most powerful and useful though is a reworking of the stair generator. Using simple 2D drawings it's possible to make complex 3D intelligent stairs. Spaces have been enhanced to accommodate atria, you can now dimension non-ADT objects, slabs can be made up from multiple components (like walls styles), sections and elevations have been enhanced, and calculations have been added to schedules. There's also lots of new content. AutoCAD's support for 3D DWF should prove useful here.

ADT 2007 doesn't exactly set the heavens on fire but the new version does offer some very usable enhancements, which will no doubt be embraced by users.

Autodesk Building Systems

Building Systems is a bit of a gem for Autodesk. It's AutoCAD-based so it pleases most of the industry and automates a lot of the drudgery that services engineers go through when working on designs. It works well with native ADT data and can make use of AutoCAD's ability to bring in DWF files. If used in 3D, the system can also reduce on-site costs by performing clash detection beforehand, as well as giving an explicit list of components required on site - reducing costs.

The product links to industry standard UK solvers, like Cymap. The new version has auto-sizing for ducts and air terminals, enhanced single-line and double-line design and layout. There are also discipline-specific tool palettes.

Buzzsaw

The project hosting market used to have 180 players developing for it. Now there's only a handful. Autodesk's Buzzsaw has stood the test of time and now has over 170,000 users worldwide. There was a new release last December, with a version due in May and August. As the service is predominantly online (you can have it behind your firewall for a few hundred thousand. Updates are seamless so they won't impact customers' day to day working.

December's release mainly saw enhancements to forms and the user's ability to create their own forms for document workflow. The next release will see expansion of the product's API (Application Programming Interface), and enhanced log in security, offering a user log-in time out. There will be a server in Europe (Switzerland) as opposed to US and mid year will see the introduction of bid management and a drawing register (showing what was sent when).

Conclusion

It's tough going doing a whistle stop round-up of Autodesk's new features and enhancements. We will come back to each of the products and review them in-depth when they become available. The winners in this round appear to be those interested in 3D or creating PDFs, or those who have bought, or are considering buying, Revit. Meanwhile, the biggest downside is the change in format, which could limit deployment of the 2007 range of AutoCAD-based products until project-end, which for some architectural projects could be measured in years.

www.autodesk.co.uk/building

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AutoCAD 2007 Launch Seminar Agenda

Introduction

AutoCAD 2007 Portfolio

AutoCAD 2007 new features, demonstration and implementation.

Introduction to break out sessions, supporting products and services.

Lunch, Display and Networking

Break Out Sessions

Break Out Session 1a - Architectural Design featuring Autodesk Architectural Desktop 2007

Break Out Session 1b - Building Services Design featuring Autodesk Building Systems 2007

Break Out Session 1c - Infrastructure Solutions Design featuring Autodesk Map 3D 2007 and Civil 3D 2007

Break Out Session 2a - Architectural and Structural Design featuring Autodesk Revit Building 9 and Revit Structure 3

Break Out Session 2b - Animation, Media and Visualisation featuring Autodesk VIZ 2007 and Autodesk 3ds Max 8

Break Out Session 2c - Project Collaboration featuring Autodesk Buzzsaw and Autodesk DWF Composer

RIBA, London - 9th & 10th May

Norton Grange, Manchester - 16th May

Villa Park, Birmingham - 17th May

Leigh Court, Bristol - 18th May

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Populating Google Earth

By Martyn Day

Google Earth gives its users access to hi-res satellite images of the entire planet. Add to this the ability to integrate 3D CAD building designs and you've got a pretty compelling solution for the construction industry.

March 14th proved to be a very interesting day in the industry, as almost overnight Google Earth appeared to become the hottest property in the AEC/Civils/Geo and Utilities markets. Stuff the publishing format war of PDF vs DWF, the place to publish your geospatial related data is on Google's (planet) Earth. This is globalisation but not as we know it.

Bentley Systems will soon be launching MicroStation XM, a major update to its foundation 2D and 3D modelling tool. All of Bentley's vertical products are built on this platform, everything from Architectural solutions, to Civil, Process Plant and Geo. One exciting new feature will allow users of its XM and current V8 release (to be delivered after the XM version) to publish both 2D and 3D data to end-user created Google Earth maps. This could be anything from 2D gas and utility pipes, to roads, a 3D process plant model, or a proposal for a new HQ building. There's even a capability to include links to PDFs, AVI movies or links to related website data.

Using Google Earth's KML format, data sets can be wrapped up and sent via email, or URLs can be used to automatically take the recipient to the Google Earth location displaying the accurate MicroStation data (which may include stored views and embedded documents). If the resolution of the satellite data is not high enough (as this varies in Google Earth), the raster data can be also extracted from MicroStation and laid over the existing texture.

The data that comes out of MicroStation is extremely accurate, more accurate than the pixel width images in Google Earth, but the examples I was shown in a demo on March 14th indicated that the accuracy is good enough for most jobs and to see the 3D design accurately portrayed in its intended position on the planet was stunning.

In one example, we went through several design variations of a proposed building 'on site', flew around it, and even 'opened' it to see floorplans which were originally PDF documents. Bentley is also making a lot out of the fact that, as MicroStation can also handle AutoCAD DWG files, it's the only solution that can collate and publish to Google Earth data from multiple systems.

The quality of the rendering is basic, but this will be improved on in the coming year. However the combination of live 3D data and Google Earth promises much. One example took us to the Philadelphia Convention centre, (which had been modelled in MicroStation) and by clicking on embedded links, animations of how the cladding was applied to the building launched within the session.

"This is the biggest thing to hit the computer industry since the spreadsheet!" said Ray Bentley, Executive Vice President, Platform Group. "If you think about a hotel owner, they could publish a model of their hotel using Google Earth on their website. As potential customers view the model it would be possible for them to click on links in the windows to see the views from each room before they booked. This is only the beginning!"

Bentley's customers include nearly all of America's Departments of Transport (DOTs). This capability will allow them to add accurate 2D/3D roads to Google Earth and examine potential changes to routes, additional roads and assess the impact of any major construction work. Or the models could be used for planning purposes.

It seems this capability will be built-into the core MicroStation product on launch, where raster satellite data can be brought in and added to 3D models. Then using a simple Latitude and Longitude reference point, the whole site can be pre-prepped to drop into Google Earth. While Satellite data needs to be added by the user at the moment, Bentley is examining the possibility of referencing the satellite overlay in Google Earth to bring into MicroStation. There may be copyright issues with this but hopefully these can be resolved.

Been Googled?

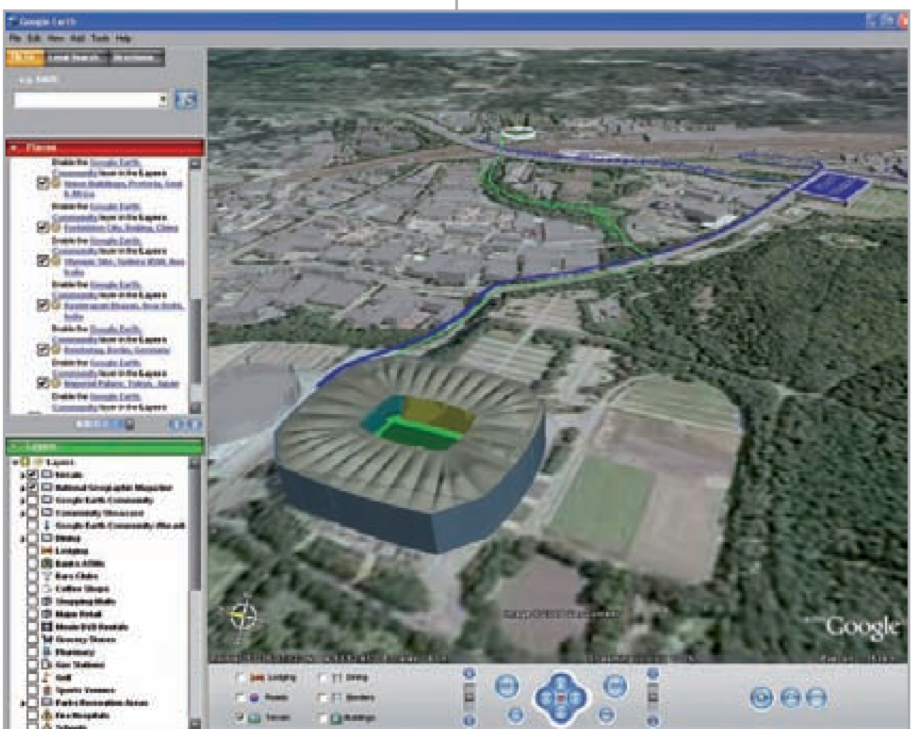
Just as the demo was coming to a close, Roopinder Tara, editor of Tenlinks emailed me the link that stated Google had just purchased @Last Software and its popular SketchUp product, which is popular with architects for conceptual design, and already has a Google Earth plug-in. Rumours of this deal had been longstanding and it had seemed to be stagnating but the announcement means that Google will now have a tool that will enable many, many users to create 3D models and visualize them in Google Earth.

From Bentley's perspective it's good news and bad news. There's synergy in the messaging and more 3D content on Google Earth will mean more 3D data for Bentley's customers to include in their Google Earth environments. The bad side is that perhaps the Google news will eclipse Bentley's innovation in the same area, as Google buying anything is big news.

It appears that SketchUp will continue to deliver the product that has been a rave success, but will now have the backing of a computer industry giant. This was probably good news for the @Last team, as Autodesk is about to launch the latest version of AutoCAD (2007), which appears to have taken their lead from many of the features in SketchUp. Google's motivations are perhaps not all that obvious, other than the growing link between Google Earth and SketchUp's ability to allow users to 'populate' its planet. In the future, the possibilities seem endless. Will Google Earth eventually become a virtual 3D blueprint for all our cities? Could historical models be created and stored as our cityscapes change, allowing us to roll forwards and backwards in time from any point in space or time?

For the industry as a whole, which has struggled to promote and 'assist' users to move to 3D - the news is that Google owns a great, easy to use 3D creation tool and will distribute it, promote it and invest in it. It appears to be the biggest kick in the backside this industry has ever had. Suddenly 3D models are cool, Google Earth is the platform and Bentley has suddenly been promoted to leading the charge at the professional-end of this new digital geocentric paradigm.

www.earth.google.com
www.bentley.com / www.sketchup.com



Creating digital reality

The recent entry of online search specialist, Google into the spatial arena with Google Earth has caused a frenzy of activity, but what implications might this new generation technology have for mapping in the construction sector?

By James Cutler

Over the past months we have explored the opportunities and challenges presented by changes in the nature of how detailed mapping products are made available to the professional map user. In so doing we have touched now and again on the tools and technologies, both embedded and emerging, that this user community has available. These are exciting and fast changing times in terms of the public perception of "mapping" technology and, by extension of, clients' expectations. It would be naïve to understate this impact so in this article we look at the new opportunities afforded to our users and some of the constraints and issues to be aware of when embracing them (as you surely will!).

Some of the more recent stories:

- Bentley Connects MicroStation to Google Earth Service
- Google purchases @Last software (SketchUp)
- Microsoft purchases GeoTango
- Skyline integrates 3D visualisation with GeoMedia
- ESRI licenses GeoMatrix toolkit to create ArcGlobe
- Swiss based Viewtec to launch TerrainView-Globe for 3D city models
- Autodesk MapGuide Open Source launched
- Mapping playing a major role in TV advertising for mobile telcos
- Mapping becoming integral to MSN, Yahoo, AOL, Ask, Amazon as well as Google
- Google requests shutdown of commercial Google hacks
- Oracle announces enterprise search tools
- Microsoft purchases Vexcel, makers of the UltraCam and FotoG software

Although MapQuest remains the leader in terms of users it is safe to say that the entry into the spatial arena of Google (not the first, but arguably the one with the most clout) has sparked both a wave of commercial and public relations activity from within the hereto fairly detached CAD/GIS domain and a recognition by the mainstream that there are undervalued and substantially untapped silos of spatial expertise, capability and content within the very same domain.

Thus such undersung CAD and 3D visualisation suites as SketchUp find themselves part of Google and GeoTango becomes submerged within the Microsoft behemoth. Does this sound the deathknell for much-loved tools, their re-emergence in different form and/or a real or perceived loss of the customer service values of the smaller companies? It depends who you believe of course but there seems little doubt that the major players are investing heavily in all manner of location and search tools and technologies.

Initially these applications were of most interest to the techie consumer and to online businesses seeking "simple" mapping components for their brochureware (think MultiMap's "inline" services, StreetsAhead and so on) as the mapping available was no better than street level. A number of factors are changing this bringing these openly accessible services and the needs of the professional user into closer proximity; amongst which are the emergence of APIs (Application Programming Interfaces) and SDKs (Software Development Toolkits), the adoption of open standards and the improvement in content detail/resolution.

APIs in particular have enabled third parties to integrate with, connect to or extend their own applications (to varying degrees and with varying levels of success and sophistication) with the likes of Google. "Mashups" and "Hacks" are now widely embedded in blogs, educational and research sites, wikis, campaigning and NGO offerings reflecting ease of use, the importance of location and the "open"ness of the tools. Even Ordnance Survey is talking about offering an API in the future.

> "Google Earth is not supposed to be used for commercial purposes or even in a business environment and it is arguable whether businesses that have Google Earth installed are creating for themselves a considerable liability."



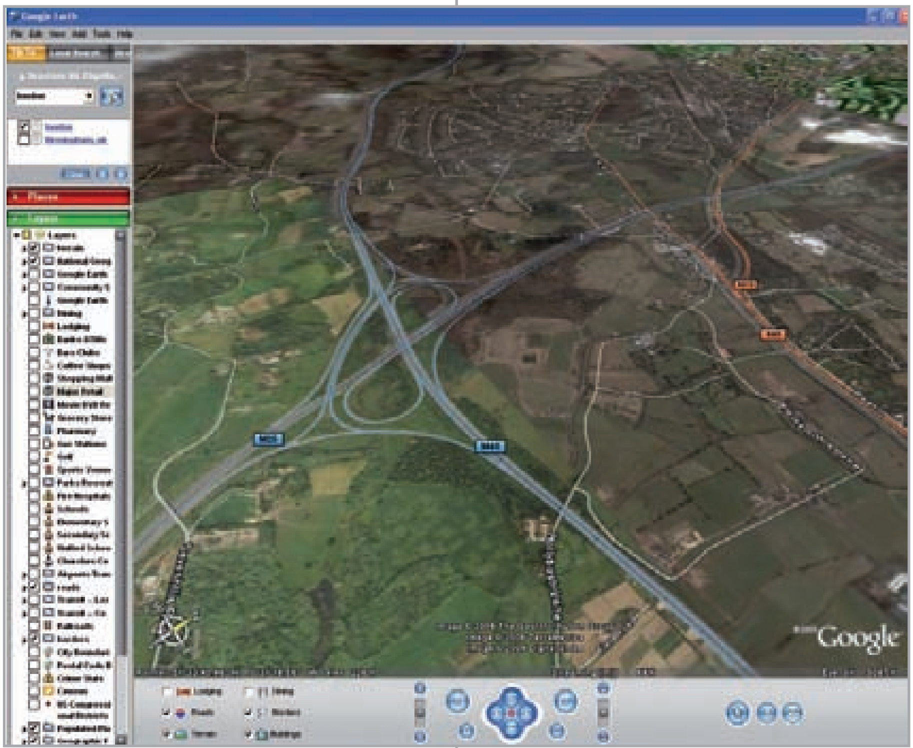
Support, amongst other things, for OGC's Web Map Service and Web Feature specifications, XML type data structures, SOAP, AJAX and .net in particular has proved an inviting stimulus to new ways of extending awareness of 2D and 3D data sets to a wider audience. Much of this stimulus comes from the US where geographic data is perceived to be, or is actually, free and where the open source community thus has a ready made, if aged and inconsistent, medium scale content on which to build. Inevitably the resulting services are part of the global commons and the desire to exploit these for private, not-for-profit and commercial reasons have contributed in part to the re-ignition of the debate in the UK around the use and re-use of public sector information, including Ordnance Survey mapping.

The decision of some content providers to license or sell detailed mapping and map-related products - usually aerial photography and satellite imagery - to the big mapping or geoportals is a stimulus of a different and disparate kind. By some this is seen as extreme short-termism by the vendors happy to have the revenue and optimistic that the license restrictions in the APIs will stick (see below) while others, equally optimistically, see this as the beginning of the end of what is regarded as expensive public sector information (about which a debate is raging in the broadsheets and online). Certainly it is both exciting and rewarding to enter a location and watch Google Earth zoom into recent detailed aerial photography for that location and to be able to either retrieve other data services over the top or even upload your own drawing files and generate a local 2.5D (which many insist on calling 3D) view of your site. Apocryphal stories also suggest that local authorities are even prepared to accept planning applications that use this approach and backdrop mapping.

Who's doing it?

As the above indicates there has been a diverse range of mashups, hacks and third party development work undertaken, much of which has appeared in one form or another online (there are currently 366 mashups listed on www.googleearthhacks.com). The most visible user/developer group tend to be technical and often open source centric while as recent acquisitions suggest, larger interests are taking a more considered commercial approach.

It is this approach that does perhaps require the most attention as there a number of issues for users to be wary of, key amongst which is licensing. Google Earth is not supposed to be used for commercial purposes or even in a business environment and it is arguable whether businesses that have Google Earth installed are creating for themselves a considerable liability. Added to which the idea that taking licensed data from, for example, Ordnance Survey and publishing KML/KMZ files based on that on Google Earth (even if licensed the $360/seat to do so) breaches the data licence! And then it is important for businesses to be aware that while they can create and host content for online applications such as Google Earth and Yahoo! Maps, for the unwary uploading data into a Google Earth environment may in some cases mean that that data may be held in perpetuity on Google's own servers with Google further retaining the right to search that data for their own purposes.



Google Earth combines satellite imagery, maps, and the power of Google search to put Geographic information at everyone's fingertips

Many consumer technology plays entering the enterprise arena have become essential business tools – Skype and instant messaging being two obvious ones – while others have been banned/prohibited/discouraged owing to the impacts on productivity and performance of individuals and infrastructure and for the risks to which the enterprise was thus exposed. It appears that for the moment Google Earth is in both camps while those who assess the opportunity/risk balance, those who exploit the potential of the tools as they continue to emerge and those who would benefit commercially (the enterprise, the mashup artists and the content providers) agree secure operational frameworks.

It's not all risk and gloom though, the times they are a changing; Google and Microsoft (and others) have moved from a position to date of organisations that collate, index and publish into the area of geographic data creation.

The likely emergence of a series of micro-payments based visualisation capabilities within consumer technology applications will enable those who develop a variety of geographic information including photo-realistic 3D models, dynamic analysis or development models (for flooding, terra-forming, urban planning), virtual worlds and much more to achieve wider audiences within and beyond the enterprise.

For traditional CAD and GIS silos these developments will be seen as potentially disruptive but from a broader perspective there are parallels with the renaissance of the "software as utility" application service provider model much-touted in the late 1990s. In this new world both the content and the functionality required to display and manipulate it are retrieved automatically from remote computers and paid for using a variety of models. Many commentators are of the view that the per seat licensing model is weaving its way into the history books to be replaced by a pay on demand/pay as you use model, a vision well served by these emerging geospatial tools and technologies and the reusable, extensible nature of the services they underpin.

This article was written by James Cutler, CEO at eMapSite, a platinum partner of Ordnance Survey and online mapping service to professional users

www.emapsite.com

Transformation engineering

Chuck Hoberman is an unusual mix of inventor, artist and mechanical engineer. He has become internationally renowned for his innovative folding structures, art installations, medical tools and toys.

Martyn Day

Earlier this year, I attended the SmartGeometry Forum in London. This group of predominantly architectural designers and computer technologists have formed a research group that explores new ways to design and interact with CAD models based on parametric design principles. The technology being explored here is applicable to all form-based design and one speaker in particular had a very interesting multi-disciplinary approach to introducing mechanisms to structural design.

Chuck Hoberman is a New York-based inventor, artist and mechanical engineer. He designs products, toys, art installations and structures that all offer, what he terms 'transformability'. Hoberman's designs change shape, size and form, such as a geodesic sphere structure that folds into a 16 inch space, or something the size of a hatbox that deploys as a 5ft tall, two person tent. It's not just about space saving design, it's the ability for a design to move and change states, perhaps adapting to climactic conditions or morph through a number of positions as an art installation. The images here give a taste for the kinds of things Hoberman creates but as they all move in some way, a visit to the company website and a look at some of the videos is well worth the time (www.hoberman.com).

On examination, the designs all use an exquisite understanding of geometry, together with standard and unique mechanical components and manufacturing techniques. Hoberman holds both Art and Science degrees and even worked at a Robotics company prior to setting up his design studio to apply his fascination with moving mechanisms within many fields. Hoberman Associates has worked on projects covering military applications, home and office products to stadium and museum installations – in fact wherever Hoberman sees his theories and many patents on transformable designs can be applied. Talking at the SmartGeometry forum, it's obvious that he sees many applications of his principles to modern architectural design, providing retractable coverings and adaptable façades – perhaps building on the concept of the building as a machine for living in, adapting and changing to the environment or usage. It's also typical of today's 'signature' architects, like Sir Norman Foster and Lord Richard Rogers, pushing structures of steel and glass to their limits, only made viable from using tools such as Catia to drive the manufacturing process and make technically complex, custom buildings financially possible.

I caught up with Chuck Hoberman on the phone in his New York workshop to find out more about he designs and manufactures his transformable structures.

Q You have qualifications spanning art and science, together with applied experience of both. What interests you about design?

Chuck Hoberman: The starting point of my whole career was looking at this transformability from the most general perspective. What I was interested in from the onset was working at a systems level, that is to say, working with the fundamental geometry and really trying to elucidate mechanical and structural principles, where all these areas come together. It's really an outcome of my education which is in the arts and sciences. It's an inherently multi-disciplinary role.

I didn't start out as, let's say, an expert in tent design, looking to improve the design of tents. It was more from a general design perspective and I've been going from general to specific application through the course of my career. I think one would come up with a different solution to the problem if I were to approach the design from a specialist point of view.

Q I guess you have come up with a range of ways to transform structures through the years. Is this knowledge always the starting point for your designs?

CH: It's a combination of these principles that form part of the 18 or so patents pending that I have. It's a library of geometric techniques. Certainly when a client comes to us for a design, I dig into those techniques. On the other hand it's also about a highly rationalised, engineering-based approach but at the same time open to new creative directions and inspiration. In many cases while my team and I are always drawing on the core principles that we share, often when a client comes to us with a problem, we only have part of the solution at hand, so we have to develop something new. It's a combination of the two.

Q Typically, what kind of customer comes to you for a 'Transformable' solution?

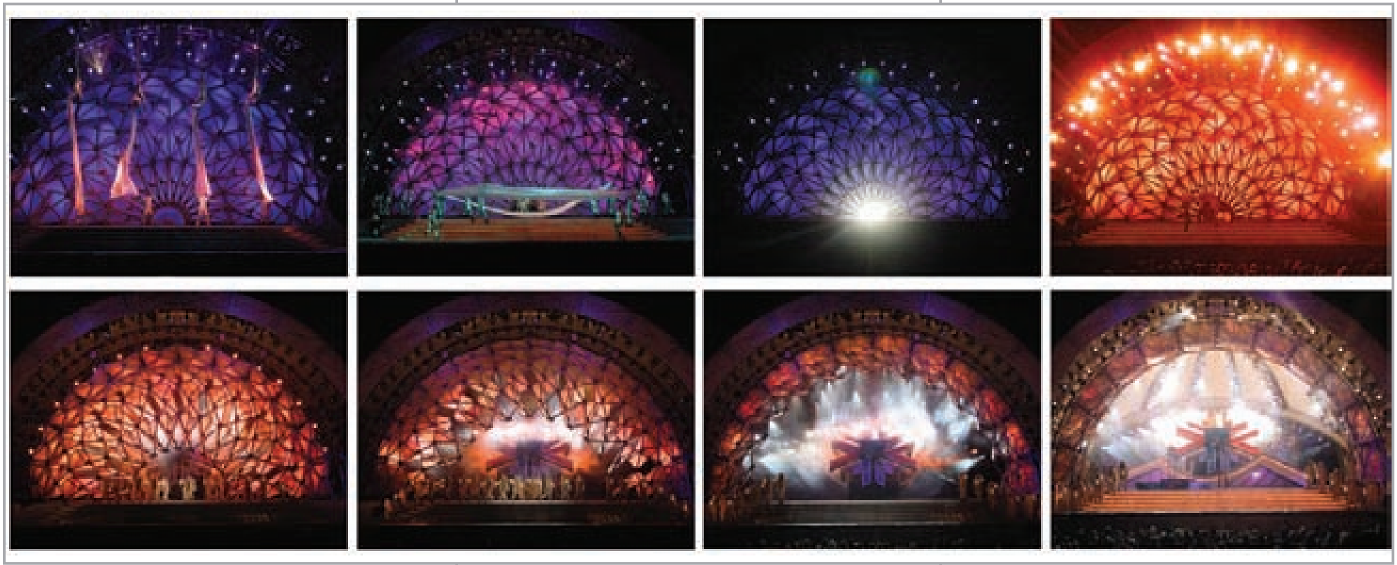
CH: The critical factor is that there is a need and enthusiasm and a requirement that our technology can address. In the case of the rapidly deployable military tent, the requirements were very stringent but we felt from the onset of that project we could meet those requirements and the result is now a product on the market has raised the bar.

Q Your solutions are unique. How do you work with clients and manufacturers?

CH: It's a process that parallels other types of design. We set up a team with a client, a small group to really understand the aspects of the brief in-depth. We then go back and work with my team, develop two or three preliminary approaches to the problem and then the challenge for us is to find the intersection between the brief, the programmatic requirements, the pools of solutions and technology that we already have to bring. We will usually develop lots of tools to convey our ideas, which could be

Chuck Hoberman and his transformable geodesic dome showing stages of transformation from 16 inches to 6 foot wide.





The transformable stage used throughout the 2002 Olympics held at Salt Lake city. Constructed of sand-blasted structural aluminium, fibre-reinforced polycarbonate sheets and more than 13,000 stainless steel connecting pins, the arch retracted in a transforming motion, like the iris of an eye. It stands 36 feet high and 72 feet wide, with 96 structural panels, each 9 feet by 5 feet, and more than 4,000 individually machined pieces. The arch was operated by two 30-horsepower motors controlling eight separate cables.

some rapid prototypes, CAD designs/models, renderings, or flythroughs.

We are small company and we are very hands on. Our approach is very grounded; we get a lot of mileage out of standard software, and standard techniques. Once we have what all sides consider is a suitable direction then we will always play a significant role in subsequent design and engineering of the product. Primarily we will handle the engineering from a design and mechanical standpoint and from a structural view we will work with one of the many structural engineering firms out there, like Buro Happold, Ove Arup or local firms in and around New York.

We have a number of fabrication houses that we work with, some are large, some are small. Very often they are firms working for the Aerospace industry or maybe theatrical, working on theme parks.

Q You mention working with Aerospace manufacturers, is that due to tolerancing of your designs?

CH: From a construction point we are working with very close tolerances. In the manufacturing world, many fabricators are used to working to the tolerances we need. There are process issues and there is an equilibrium to be found with the tolerance and scale of the project. Very often if you are building large structures you have to be aware of the economic costs of over-tolerancing a design.

We mainly get our projects machined, with some casting. Our toys are injection moulded, of course. Sometimes we can use surprising low-tech solutions for fabrication. For the piece we did for the Utah Winter Olympics, we needed a big arch to support our mechanical curtain and that was a series of large welded trapezoidal frames that bolted together. These had slides on them, which had to be oriented carefully to keep the mechanism aligned. The actual layout was done on the factory floor, they laid out a grid, 4ft by 8ft, which is the size of sheet of plywood. They took these sheets of plywood onto the CNC machine and etched the outlines of these trapezoidal shapes and laid them out across the grid, so there was a big one to one image of this arch on the floor (around 80ft long). They used this as their template and it gave perfectly adequate tolerancing for what we were looking for and the cost was minimal. Our fabricator came up with that, it was a smart practical solution.

Q Many of your designs use hinges and joints, are these bespoke or standard parts?

CH: We really don't need to develop components; most have been pre-manufactured for us. It's all out there - they aren't all that 'standard' but they are out there. I am happy that we don't need to innovate at the detail level! We are about the global integration of all these components, at a systems level, to get something that performs.

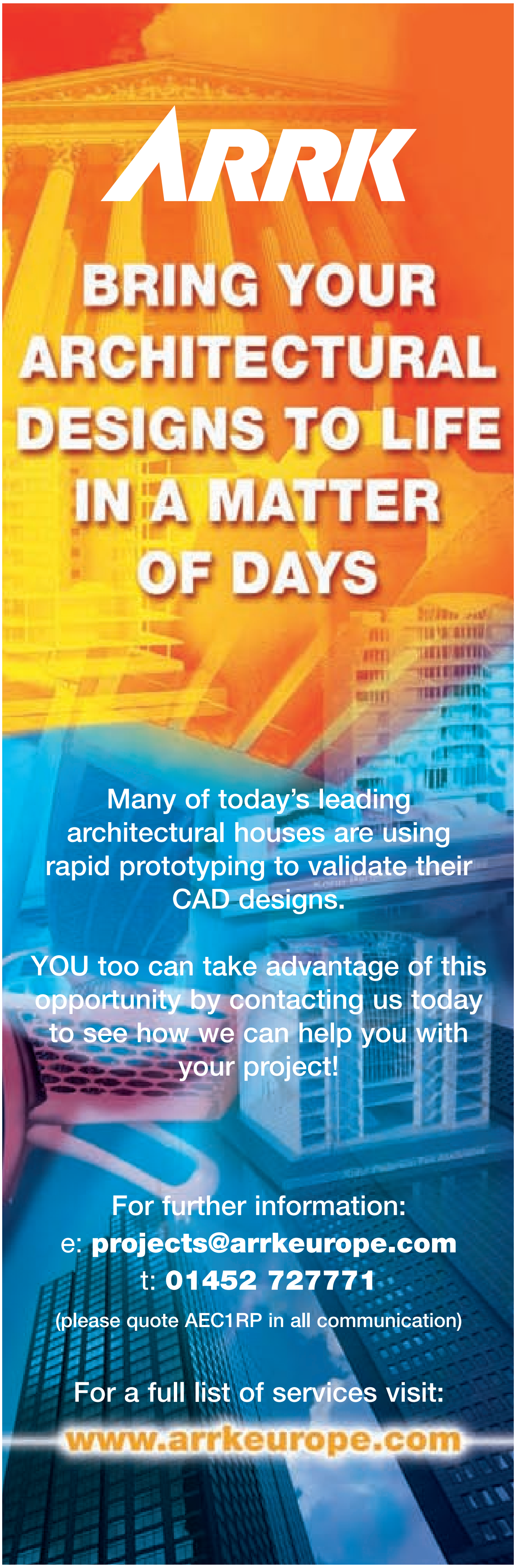
Q You use Autodesk Inventor as your modelling tool. How do you use 3D CAD?

CH: I'm not an advanced CAD user but I have been using CAD for 20 years and when I started designing my structures I had no access to any 3D software at all, so I just wrote code to create the geometric representation, as well as render the output. This was on a Macintosh. I had to do the transforms to project the geometry onto a picture plane and come up with my own shading and hidden line algorithms. It was ridiculous, but it was out of necessity. If I wanted to show someone a picture, I'd print this stuff out on a dot matrix printed and tile the plots out! But it was a good experience as I got to know what all these tools are about.

The use of Inventor is a legacy as we grew up with AutoCAD - it's a natural follow on. We take advantage of the parametric capabilities at a component level, which means we can adapt the design easily and most of our structures use families of parts, or parts that have similar features but are geometrically different, so that's useful.

We build assemblies with mechanical constraints so we can simulate the kinematics, the mechanical action of




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The Iris roof: a prime example of Hoberman's transformable structures.

our structures. However, we don't include the forces or do force analysis in Inventor. Instead we do a fair amount of paper, pencil and spreadsheet calculations!

As the project is being finalised, that's when we go outside to a structural house and generally speaking, even then, they are not doing a full-motion dynamic calculation, they will do a static analysis. If, for instance, we have a cable driven structure, they will pin the structure into one position, by 'fixing' the cables, then run the analysis, get the forces and repeat that in a series of positions. It's actually going into a fairly standard analysis package from their point of view.

Internally, we have a prototyping shop where we will use laser cutting, STL, machine parts, any technique that's useful for a given project. To be honest on the software side of what we do, we tend to stay with fairly standard packages.

Q Do you send 3D CAD data to the fabricators or 2D drawings?

CH: It still depends on the fabricator but things have certainly improved over the last five or six years. We can hand them the 3D file and most have the software to generate all the tool paths. I am of the mind that if we understand the manufacturing technique we can have a meaningful dialogue with manufacture and work out how to do it economically.

We don't just do the mechanisms, we also produce the electrical wiring controls, and the flow chart for integrated programming for lighting and motion. I am a mechanical engineer, I worked for six years in industrial robotics. There is so much of what we do that is similar to that industry, we are working with the same firms that do motion controls systems, robotics systems but putting it into a different context.

Q Where do you see your Transformable designs being used in an Architectural context?

CH: There's a spectrum of architectural possibilities; a quick rapid set-up and modular approach, a fixed installation that offers variability and movement of the building over time, or something structural, like the roof may open and close. The process that these ideas share is the fundamental way of looking at changeability and movement. It's a very complex equation with design, functional, and economic issues to be assessed. The role that I am trying to play is really to seed the discussion offering new practical, technical solutions and also just trying to spark people to think about design in a broader way.

Q SmartGeometry appears to be about complex form and shape development. What is it that is applicable to transformability.

CH: The reason we are interested in SmartGeometry is to push parametric design to a much earlier part of the design process. So, instead of using our specialised techniques for form finding and creating geometry, we can automate that process and hopefully get to design solutions a lot quicker and in an easier way.

I've been aware of smart geometry for about a year, from some of the engineering firms here in New York. There could be enormous value for us, as we work with highly defined rule-base systems for developing designs. Since we know our rules really well, they may not be that simple and have many steps but it could be possible to develop algorithms for these. If what you can do is find a free form for a building shape by easily adjusting that form, and have the computer take care of the geometry and connections, then our approach is a poster child for that. We have been doing that in a more low-tech way because that's where the current technology is at.

SmartGeometry is a different mindset for design. If you are starting with an algorithmic approach to design, where the first thing you set up are the rules, then you are in a different place than a paper and pencil sketch. I think it's a matter of time, until people become accustomed to the techniques. The other area where this whole highly-parametric approach interfaces with the transformability of designs, is the time component. When we design a structure, it has an infinite number of states, which in a sense in just one more parameter, but you can bring that transformable shape parameter into direct relations with any other design parameter that you may be looking at. It's a powerful idea for us. For instance, if you see people working in these parametric programs, they generate a field of variable design possibilities. Within each of these possibilities there's this time component, where any one of those designs can be set into motion, going through all its changes in configuration. What this does, is takes what is inherently complex and breaks it into a very rich experiential design process giving many different possibilities and automatically optimising for all the different constraints in the project. Everyone here in the office is intellectually engaged with the concept.

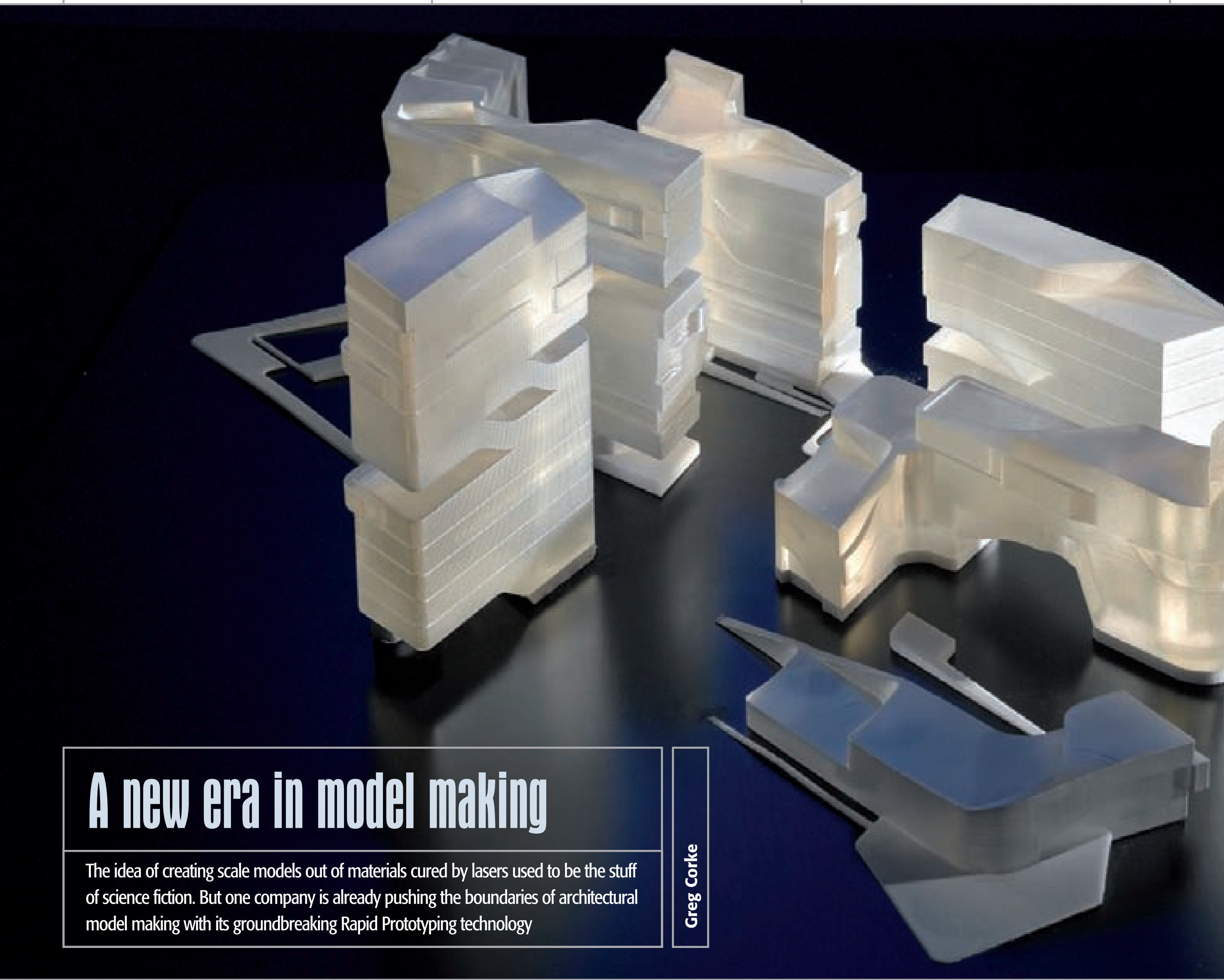
Q So do you think this highly-parametric and algorithmic approach will impact your designs?

CH: When I present to designers, they say 'Your stuff looks pretty symmetrical. What can you do that's asymmetric, that has more complexity or more interesting forms?" I think certainly, there would be a benefit from deploying these kinds of extremely parametric systems. Our transformable design techniques are adaptable to asymmetric systems but the time to design is higher and there's a cost penalty for going in that direction. However as designers our job is to respond to the vision of the architect. Transformable design is not about a particular look or feel or design, it's a flexible design approach that will fit with many types of designs. If the architect is looking for blobby, we can do blobby, if the architect is looking for something curved, our techniques are adaptable and that's what interests me.

Q So what do you hope for transformable design in the future?

CH: With regard to Hoberman as an entity, we are technologists and technology holders. The future is to move it more towards a design tool, approach and philosophy that is accessible for advanced designers and forward looking designers. I'd like it to have a much broader base.





A new era in model making

The idea of creating scale models out of materials cured by lasers used to be the stuff of science fiction. But one company is already pushing the boundaries of architectural model making with its groundbreaking Rapid Prototyping technology

Greg Corke

Architectural model making has undergone a revolution in the past few years. The ability to create scale models directly from 3D CAD data in a matter of hours is a reality and the technology is currently being used by key architectural practices for the creation of proposed and as-built designs. One of the pioneers of this technology in the UK and throughout the world is ARRK, whose European Rapid Prototyping Headquarters is based just outside of Gloucester.

Rapid Prototyping, as the name suggests, is a group of technologies used to create physical prototype models in a short space of time. The technology has been used extensively in product development and automotive design for a number of years, but its level of adoption by the architectural sector is still, by comparison, relatively low.

Looking to broaden its already impressive reach across many industry sectors, ARRK began focussing specifically on the architectural market 18 months ago. Since then key architectural practices including Zaha Hadid, KPF, Wilkinson Eyre, and Grimshaws have joined the company's distinguished client list, with ARRK producing a whole assortment of architectural scale models ranging in size from that of a matchbox to a kitchen table. So how exactly are these models made?

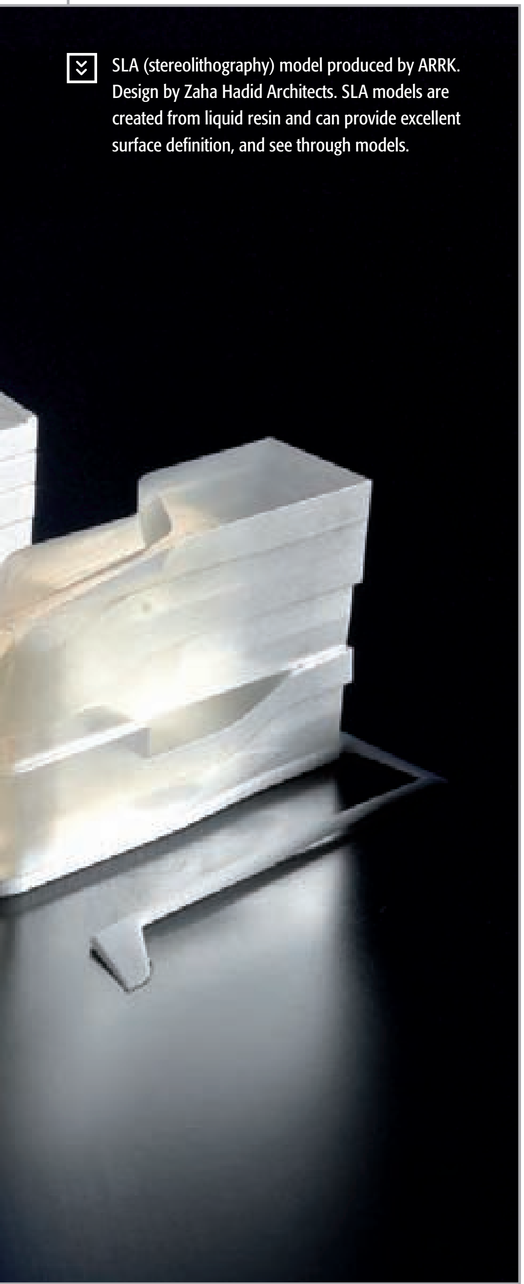
The prototyping technologies

There are two key technologies that ARRK employs for the production of its architectural models. These are Selective Laser Sintering (SLS) which forms models from a fine powder and Stereolithography (SLA) which creates models from a liquid resin. Both technologies deliver different results, and their application depends on the requirements of the client. SLS, for example, is ideal when interior details are required within a structure, but because it uses powder its surface finish is a little rough. SLA, on the other hand can provide excellent surface definition and see through models, but the resin-based material can also be brittle and sensitive to warping under heat.

The actual model production process is different between SLA and SLS, but the key concept that unites both technologies is that models are built up layer by layer using a laser to cure the build material. For each thin covering of powder or resin that is laid down a solid is formed only in areas where the laser comes into contact with the material. At the end of the build process the material that hasn't been cured by the laser just falls away revealing the finished model.

It's worth noting here that for SLA models supports are often required to keep the model in place during the build process. These temporary lattice structures, which act a bit like scaffolding, are made out of the same resin as the model but are easily snapped off after the model has been built.

Supports are not required for the SLS process as the uncured powder is able to hold the model in place, much like a spoon in a bowl of flour. This is one of the reasons why SLS is often preferred for architectural models, as it is



SLA (stereolithography) model produced by ARRK. Design by Zaha Hadid Architects. SLA models are created from liquid resin and can provide excellent surface definition, and see through models.

easier to build interior details within a structure without supports (the current split in architectural model making at ARRK between powder-based SLS and resin-based SLA is somewhere in the region of 65:35)

For model production, a degree of hand finishing is often necessary after the build, particularly for SLA models to smooth the surface or to hide marks made by layering or supports. Some clients also require additional finishing on their models such as paint jobs or specific textures.

In terms of single build volumes, ARRK currently has a capacity of 500 x 500 x 500mm for single SLA models and 400 x 340 x 270mm for single SLS models. However, like many Rapid Prototyping bureaux the company commonly joins multiple models together if a larger model is required. Finished models are expertly packed and can be sent out by courier all over the word, or even hand delivered if they are particularly large or fragile.

If you want to find out more about how the specific SLA and SLS technologies works go to *prototype* magazine's website ***www.prototypemagazine.com***, an excellent resource for all matters related to Rapid Prototyping, and one of AEC magazine's sister publications.



SLS (Selective Laser Sintering) model produced by ARRK. Design by Kohn Pederson Fox Associates. SLS models are created from powder and are ideal when fine detail is required particularly for interiors of buildings.



Creating model data

ARRK can provide a budgetary quote from something as simple as a sketch and an XYZ dimension, but for a more formal quote (and of course in order to build your physical model) 3D CAD data is required. This can be sent to ARRK in a number of formats but the industry standard Rapid Prototyping format, STL is by far the most common, but it should be noted that not all 3D CAD systems produce good STL output.

To help with the process of data production, ARRK runs CAD schools with clients to teach them the best way to export data from a wide range of 3D CAD applications. These sessions also include tips on the most effective way to build 3D CAD models specifically for Rapid Prototype model production.

"We teach our clients the importance of creating separate models for building design and rapid prototyping," explains Craig Vickers, Operations Director, ARRK. "A classic example is the client who designed a 100m high office block and wanted to create a 1m high scale RP model. They simply scaled their model down in their CAD program which resulted in the walls having a physical thickness of one micron, which is too small for RP models (this is currently limited to 0.5mm). Naturally we were able to rectify this, but if the customer's data is right first time, it will streamline the whole process, reducing turnaround time and of course cost."

Time and cost benefits

Of course one of the major attractions of this technology is the extremely quick turnaround times, which is a major selling point for ARRK when offering up Rapid Prototyping as an alternative to traditional model making.

"While traditional model makers may take weeks, the average turnaround for projects is two to three days," says Craig, Operations Director, ARRK, "and everyone is quoted within 24 hours, and most within eight."

In addition to turnaround time, the relatively low cost of models is a major draw for many clients. Models can cost anywhere from tens of pounds to thousands of pounds depending on size, which is the primary driver as this dictates the amount of machine time. Other factors that affect cost include amount of surface finishing, and any required textures or painting. These post processes are all done by hand in house by extremely skilled labour, which is in contrast to the various automated Rapid Prototyping technologies used for actual model production.

With 12 SLA and 3 SLS machines in house ARRK's European Rapid Prototyping Headquarters is set up to deliver a quick turnaround time for urgent jobs. However, for those where time is not such an issue, ARRK can also offer discounted rates, a service which, not surprisingly, is particularly popular with students. In addition ARRK also offers Polyurethane (PU) and foundry castings (in aluminium and zinc), for the creation of short batch runs for actual architectural fittings such as specialised door handles.

Conclusion

When you consider the turnaround time and cost, the quality of models that ARRK can produce with its in-house RP technology is astounding. Intricate details are no problem, and slender structural frames can be produced with ease with no impact on build time. In addition, the company's attention to detail at all stages of the model making process is incredible, and the enthusiasm that is evident throughout the whole team for solving new build problems, such as those encountered in new areas of Architectural model making, is refreshing.

So with services such as these available what does this mean for the traditional architectural model maker? I have no doubt that RP technology has the ability to replace traditional techniques in various areas of industry, as it has already at many of the top architectural firms. And, while some may feel that the human element and individual style is lost by using these technologies, the cost and time benefits of RP cannot be ignored. And it's these two factors alone that look certain to push RP model production in the architectural sector to new heights in 2006.

www.arrkeurope.com

Executive briefing: Bentley Systems

Over the last few years it's all gone a bit quiet on the marketing front at Bentley Systems. Martyn Day caught up with Tony Flynn, Bentley's VP of marketing, to find out exactly what the multidisciplinary AEC and infrastructure CAD company has been up to.



Tony Flynn, Bentley's VP of marketing

Q What's your view on the AEC technology market today? What are the key trends?

Tony Flynn: I'm more excited now about the infrastructure market than ever. Engineering News Record (the US-based construction industry magazine – Ed) is predicting over $4 trillion in construction for next year. There is much to improve in the world. And software for infrastructure can do much to help. Here, I see four main advances.

First, general-purpose CAD is morphing and upgrading into specific disciplines. For example, CAD for architecture is becoming BIM (Building Information Modelling), which is boosting productivity and collaboration.

Second, products are becoming more integrated and interoperable, which is increasing quality and decreasing data loss. For example, the convergence of design and structural analysis enables building designers to simulate their designs and increase quality. The same holds true for water networks. Another example, the convergence of CAD and GIS results in fewer data translations, and therefore cuts data loss and expense for utilities, communications companies, cities, and others.

Third, software servers are taking collaboration forward by quantum leaps, cutting costs and improving performance. And that's particularly fortunate, because most infrastructure work is now performed by distributed enterprises which must tap and connect top talent from multiple locations, often around the world.

Lastly, enterprise subscriptions for software and training are creating much more agile organisations. By removing many administrative barriers, these organisations are realising just-in-time productivity increases and more quickly responding to project needs and opportunities.

Q Where would you place Bentley's position in the market vs. its competitors? (key differentiators, unique selling points, customer profile).

TF: Bentley is in a very strong position, and getting stronger. We're the largest software provider focused on the infrastructure market. More than 80% of the Engineering News Record 500, more than ten of the "UK Architecture 15", and 47 US state DOTs now rely on Bentley products. And Daratech recently ranked us #1 in revenue in 14 categories of plant software.

We are in first or second place in each of our verticals: building, civil, plant, and geospatial - a testament to the strength and advantages of our solutions over other choices.

In building, for example, we offer a single, strong BIM solution for architects, A/E firms, construction companies, and owners. The other choice is Autodesk, which does not offer a single, strong solution for BIM. In fact, it offers two weaker platforms: Revit, for simpler, smallish projects; and AutoCAD, with a future in building that even Autodesk executives question.

In geospatial, we offer solutions with CAD/GIS integration as well as interoperability. ESRI is a great, isolated GIS product, especially for non-infrastructure projects. But, for infrastructure projects, geospatial users prefer to plan in the context of engineering, and engineers prefer to design and maintain in the context of GIS.

Here, we've just announced our unique Google Earth connection. It's amazing! We believe that it will become the most popular way to view and navigate CAD and GIS data together.

At the high end, we're unique in offering CAD/GIS interoperability - where the two systems communicate in real time. By eliminating never-ending CAD to GIS translations, governments, utilities, and communication companies are slashing data loss and streamlining workflows.

In plant, we offer comprehensive solutions for the distributed enterprise, whereas Intergraph is offering a 1980s solution to a 2006 problem. Plant owner-operators need a lifecycle solution that thrives in the distributed enterprise, whereas Intergraph's solution is a frozen-in-time centralized system that struggles to scale to today's requirements.

In civil, we have lifecycle solutions for road, rail, site, and water infrastructure. In fact, water and road are two of our strongest segments. We have a particularly strong maintenance solution for rail, and site design is an emerging market for us, especially given the opportunity presented by Autodesk's transition from LDD to Civil3D.

Q AEC CAD appears to be mature market with few new users. Where do you see Bentley's growth coming from? Or are there new customers?

TF: Again, our market is software for infrastructure. Worldwide, construction of infrastructure is a $4trillion business. By comparison, the GDP of the world is about $40trillion. So I'm not sure I agree that software for infrastructure is a "mature market with few new users." Quite the opposite, there's much to improve in this $4trillion investment, and we are eager to help with software.

Tens of thousands don't even have professional CAD software, particularly in the developing economies of China and India. Current CAD users want more vertical applications in order to be more productive and produce better work. Collaboration software is becoming more attractive - to the point of becoming a requirement - in a world of distributed enterprises.

Also, we see an expanding market for O&M (operation and maintenance) software, especially for railways, plants, and roads.

Besides, Bentley is very competitive and always on the lookout for adding more value. So we've set our sights on gaining market share in all of our verticals.

Q Has BIM been a measurable success, a slow burn or a non-event?

TF: A definite, measurable success, and gaining momentum. We have many users applying BIM, and many even setting it as their standard of practice. Nearly every architecture and A/E firm now aspires to BIM and wants a path to BIM in their software solution. This is not just for architects, but for engineers (structural and building services as well), and it's even quite relevant for construction conglomerates.

Most importantly, even owner-operators, who write the cheques and are the ultimate decision makers, are increasingly demanding BIM. Good examples of this in the US are the General Services Administration - the largest owner-operator in the US - and General Motors.

BIM unites everyone in the supply chain, thus improving it. BIM is now virtually always a component of any discussion with architects and engineers and contractors, and it is always about "how", never about "if".

Q I'm impressed with the growing following for Bentley's SmartGeometry technology which is still in beta. How does SmartGeometry fit into the Bentley's architectural suite?

TF: Yes, the technology is inspiring and one that allows people to do something they could not do before. But note that Bentley's technology is named GenerativeComponents (www.bentley.com/gc); "SmartGeometry Group" is a non-profit organisation of users/advocates/researchers (www.smartgeometry.org). GenerativeComponents is the high-level conceptual tool that allows designers to experiment with building shapes and, by design, stay within the design requirements.

To answer your question, GenerativeComponents is 100% integrated with Bentley products. It can drive geom-

etry and coordinate with any of Bentley's BIM portfolio, including Bentley Architecture, Bentley Structural, Bentley Building Mechanical Systems, and Bentley Building Electrical Systems. It's part of the beauty of a single, strong BIM platform - this world-class conceptual tool immediately raises all these boats.

Q Bentley's route to market is a mix of direct and dealer (VAR). Moving forward, what's the channel strategy?

TF: To major accounts, we sell directly. To small to medium accounts, we use eSales often assisted by channel partner experts.

Increasingly, we're finding that eSales with product specialists is the best and most leveraged way for Bentley and the buyer. As our product line and target geographies expand, it's the most efficient way to understand needs and communicate value to all corners of the world. It also happens to be our fastest-growing distribution method.

Q Last year Bentley ran an aggressive 'you deserve better' campaign against Autodesk's upgrade policy. How successful was it? Will you be doing the same this year? Isn't MicroStation more expensive to buy and own?

TF: It was the most successful campaign we've ever run to upgrade Autodesk users to Bentley products. We found that CAD users need their products to natively support the three most popular file formats, DWG, DGN, and PDF. And they need historical, non-retiring support of these formats - not forced retirement that carries expensive and unfortunate consequences.

They also appreciate the superior price/performance of PowerDraft, the vertical Power products, MicroStation, and MicroStation applications. In hybrid accounts, we also see a move to consolidate DWG/DGN support using MicroStation - a move the significantly lowers their cost of administration.

In China, our PowerDraft Web site is the most popular offer we ever made. You'll soon hear about this year's "you deserve better" programs.

Q Bentley doesn't appear to have a traditional view to marketing brand and technology. What's the marketing strategy?

TF: I'm not sure what a "traditional" view of marketing is. Regardless, we have a focused and strong marketing strategy.

First, we are uniquely and strongly positioned as a company: Bentley provides software for the world's infrastructure. That is very focused, easy to understand, helps to drive our colleagues every day, helps to draw partners, and it's clear to our users and prospects that we want to improve their business and our world. Again, we're the largest software vendor dedicated to this market.

Second, we provide important networking opportunities for our users. In their fast-changing world, they want to learn best practices from each other in order to stay their most productive. Here, the BE Conference is wildly popular, with 99% satisfaction rates among attendees. The BE Awards identify and promote the most amazing projects of our users. BE Magazine, as well, has the largest circulation of any digital magazine in our space.

Third, we sponsor a thought leadership series for executives. Increasingly, technology is becoming a strategic issue in our user organisations - it is a top reason why they thrive. Executives want to stay abreast of the latest trends and developments of not just our technologies, but also related technologies. They typically think forward two to three years. And they typically enjoy discussing it with a small group of like-minded executives, mostly within their industry. This series give them that opportunity.

Finally, in identifying and interesting new users, we like eMarketing. Using bentley.com, email, eSeminars, and more as a marketing machine offers us much higher ROI than traditional means -about 100 times higher. And it's better and more efficient for the prospect. We can communicate directly with them and understand their needs as individuals - anywhere around the world! And they can quickly get the detailed information and the sales expert they need to make their decisions.

We're excited that our bentley.com traffic is up over 200 percent year-over-year. And recall that eSales, the partner of eMarketing, is our fastest growing channel.

Q The BE Conference appears to be the main event on the Bentley Calendar. This year there's a European mirror event in Prague. What are the main ingredients of the BE conference? Why Europe now?

TF: The BE Conference comprises once-a-year learning opportunities for Bentley users and their managers who want to sharpen their skills and expand their knowledge. It has over 300 keynote, training, new-technology, and best-practice sessions. BE Conference 2006 happens in Charlotte, the home of NASCAR, in late May.

For our European users this year, we are essentially recreating BE Conference 2006 in Prague in early June - with one exception - the BE Awards of Excellence judging and ceremony takes place only in the US.

Why in Europe now? It's a question of demand; Our users are asking for it. For many of them, it's far easier to attend there.

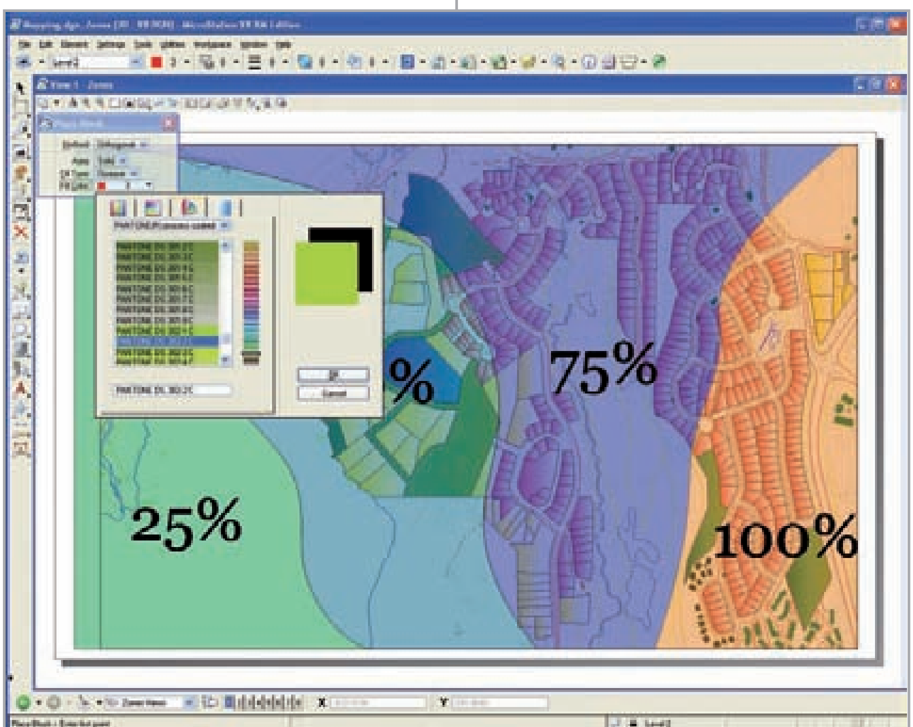
Q What are the challenges facing Bentley in the next three years?

TF: Maybe I should say that my immediate challenge is completing this tough interview! Bentley's biggest challenge is to continue to increase our value-add to the infrastructure market. Here, we want to continue to define the state-of-the-art in technology - our heritage. Here, we want to continue to expand our portfolio of solutions through strategic and timely acquisitions. And, here we want to continue to lead the market in interoperability.

Another challenge is to continue to expand internationally. The whole world needs infrastructure and we want to fully help all countries increase their infrastructure performance. You may already know that we have moved two senior executives to Asia to better serve those markets. There and throughout the world, we are improving the reach and efficiency of our sales, marketing, and service models. And, before I end, I want to mention that we're off and running with global services - with over 500 professionals, we have perhaps the largest service organisation in infrastructure software in the world.

And, ending with marketing, we need to continue to clarify our advantages over Autodesk, ESRI, and Intergraph. That's a challenge that we welcome because, for the infrastructure market and organisations that we serve, the advantages that we offer are clear and compelling.

www.bentley.com




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Revit: beyond architecture

Autodesk has recently introduced dedicated versions of Revit for Structural and Building Services engineering to sit alongside the core building design tool. Paul Woddy, CADline, discusses how Revit is maturing into a multi-disciplinary AEC design tool.

By Paul Woddy



I imagine that the developers of all new design software envision their creation being the standard platform and a universal format for all disciplines. Historically, success of this level has perhaps taken a mixture of great product, arrogance and an over-abundance of pirated software. Certainly, the triumph of the dwg format owes a little to each of the above.

In the construction sector, the concept of multi-discipline Single Building Modelling has been on the table for a number of years with little or no practical success. The answer could arrive in the form of a common interface language allowing existing applications to communicate, such as IFC. I have personally yet to see any major success in getting one IFC compatible application to fully talk to another, but assume it will get there eventually.

Alternatively the answer may lie with a suite of products on a common platform that will provide each team member with the best tools available within each discipline.

We can all see the advantages of having each design team feed information into the same intelligent model, effortlessly dealing with questions as they arise, and issuing a final drawing set, co-ordinated, accurate, on time, on budget and without conflicts. Perhaps we could add 'free beer for all' to the end of that statement to top it off.

Just as obvious are the foreseeable hurdles in this idea. You can almost hear some of the objections now.

"I don't get paid for that."

"I didn't formally issue that to you, it was just an option."

"Who owns the rights and responsibilities for this information?"

"Wasn't me!"

So, is it possible? Can one product ever meet the requirements of the entire construction industry? Can we really get free beer?

The Revit Story so far

The Revit development team followed the linear process of design and construction in starting with the architectural. Any civil, structural or building services functionality available within Revit has been intended as an architectural interpretation of the requirements in those fields. As such, architects had some tools to represent steel and concrete, mechanical and electrical fixtures and fittings and landscape design but, to-date, only the most forward thinking engineers have picked up on the general advantages of using Revit over other packages more specifically targeted at their own market sector.

The advantages are there to be had, and this has been ably demonstrated by several engineering consultants who have taken Revit on board to face, head-on, issues such as those raised in John Prescott's Rethinking Construction report. The report highlighted the need to reduce construction costs and defects in construction projects considerably mainly through co-ordination and communication.

Over the years, users have enhanced the structural functionality available in Revit by using the raw concepts of parametric modelling to construct intelligent elements such as portal frames and roof trusses, proving that the strengths of the software lie in the parametrics and model co-ordination and that the applications to which these concepts can be applied is without limits.

Revit – communicate or dominate?

The real process efficiency improvements have so far been in the architectural arena, with short learning curves and massive increases in productivity, but as Revit starts to digress into other disciplines we should see similarly dramatic improvements there.

So how far will Revit go? Will we see analysis tools and full fabrication modelling? Who knows? Autodesk has thus far restricted its activities to draughting tools and as such, does not aim to perform design and analysis tasks as standard functionality. What we see in Revit Structures is a modelling interface that communicates with analysis software, providing a graphical interface to the calculations with unprecedented communication links to the Revit-based Architect. Whether Revit will ever look to 3D model in any more detail than GA for say an accurate connection detail is yet to be seen.

Revit Structures appears to be eagerly anticipated by the engineering community, not because it brings a huge amount of new structural capability to the table but because of the basic co-ordination and communication principles of Revit which have made it popular with architects and designers.

Where the biggest gains will be realised is in design-and-build packages and where the owner / operators have in-house design teams. In these instances there is a vested interest in collating and owning the information from concept through construction and onto facilities management with as little reworking and re-interpretation of the data as possible.

Although Revit is starting to look to other disciplines, development of the architectural functionality has not been forgotten. Scalability and user efficiency are improving with each release with the addition of new tools and the removal of old bugs moving at pace. When asked to describe the headline of each new release, I struggle to find one element or theme to focus on, due to the volume of small adjustments as opposed to a major new feature. My favourites are usually something that only existing users of the software recognise as being important, whether it be an efficiency enhancement or something that we have been asking to be put right for ages. User feedback drives the product forward and it is only through user feedback that the product can be perfected.

Digital Prototyping – it's virtually real!

So it looks like Digital Construction is here at last, but is Revit up to the job of being the one-stop-shop for all construction professionals, now and into the future? Well, it certainly has the right concepts and principles at its core and the functionality wrapped around it has so far proved popular with its target audience. I fully expect that Revit Structures will make a big impact on, not just the Structural Engineering market, but on Revit take-up generally as the big players make use of the collaborative benefits, and I don't see why the principles can't be extended to suit other engineering disciplines. After that it is up to the industry to decide how to incorporate the idea of true collaboration within the design process and to accommodate a common standard of sharing and presenting material. The politics aside, I think it can, and if any one organisation can do it then Autodesk is in a stronger position than others to push the concept. I am genuinely excited to see the functionality that may be on the way and hope that the industry is ready for the changes that will follow.

www.cadline.co.uk

Fasttrack Schedule

Fasttrack Schedule enables Project Managers to control the construction process with a range of intuitive and simple to use tools to help effectively plan and manage Gannt chart schedules, and track project resources.

Greg Corke

Product: Fasttrack Schedule **Supplier:** AEC Software / Computers Unlimited **Price:** £289 per seat

Project management is an essential part of all construction schemes, which more often than not are managed by dedicated software systems. However, the costs involved in implementing such systems can often be seen as prohibitive, particularly for smaller companies who cannot afford, or indeed need, bespoke implementations complete with training. As a result, off the shelf products like Microsoft Project continue to enjoy much success in the construction sector. They may not be as scaleable and capable as made to measure systems from vendors such as Primavera or Buzzsaw, but it is possible to get up and running in a relatively short space of time, and let's not forget that the cost of implementation is sure to be much lower.

In addition to Microsoft Project, there are many options when it comes to off-the-shelf Project Management software. Fasttrack Schedule from AEC software is one such alternative, and one that has been in development since 1988 and is now a mature product, currently on Version 9. Simplicity is key for the Mac and PC software tool, and the principle aim of Fasttrack Schedule is to provide a set of easy to use scheduling tools to help project managers plan more efficiently, while keeping projects on track and within budget. So how exactly does it do this?

Scheduling

Fasttrack Schedule provides users with three project planning environments, the Schedule View, Resource View and Calendar View. Each view is easily accessible via a pull down menu which resides at the top left corner of the screen, and data can be linked between all three views. The schedule view takes the form of a traditional GANTT chart and is the starting point for any project. It's here that Project Managers create and place new activities in the timeline graph using bars or milestones to define the start/finish points and duration. Bars can be clicked and dragged to define the duration of the activity or you can type in the exact date and time. Activities can also be broken down into stages, and once you've input the timelines for each stage, they can be expanded or collapsed to see the full details and timelines or a summary of each stage. The project manager can format bars and milestones with colour, patterns and labels, to help differentiate the various stages of the project. The schedule can also be broken down in manageable chunks using Fasttrack Schedule's customisable filters that search for and display specific tasks.

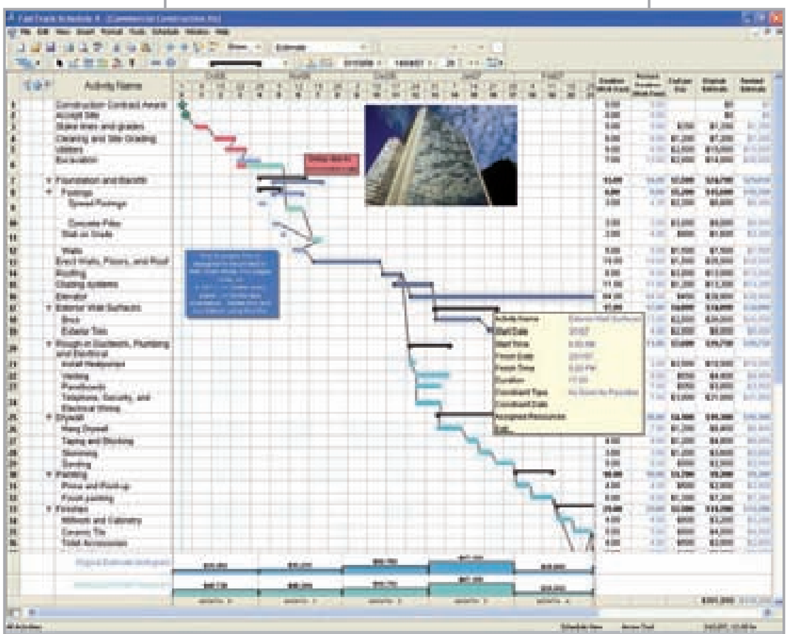
To help get new users up and running quickly, over 30 example schedules and QuickStart templates, spanning a variety of industries, are also provided.

Resource tracking

Once the Project Manager has defined the various activities and stages within the project they need to assign who or what is responsible for completing that task. New resources are created in Fasttrack Schedule's Resource View by entering key data such as name, type, per use cost, standard rate, or overtime rate. Each resource has a finite amount of time it can be used and an associated cost attached to it.

In addition to the schedule work calendar, Fasttrack Schedule lets you create an individual work calendar for each resource, which enables you to manage individual resources more effectively by taking into account factors such as holidays, breaks and variable work shifts.

Of course, the real power of Fasttrack Schedule comes into play when you link a resource and all of its data to a task within the schedule. Resource assignments are made within the Schedule view - you simply double click on the bar you would like to assign a resource to, then assign an hourly or a one off rate. This, of course, will enable Project Managers to calculate estimates of both time and money.



The schedule view takes the form of a traditional GANTT chart and it's here that Project Managers create and place new activities in the timeline graph using bars or milestones.

Tracking progress

In addition to providing the means to help you plan your project, it's essential to track and update progress throughout its lifecycle and Fasttrack Schedule provides a suite of tools to help you do just this. It records changes by tracking three sets of dates, times and durations for each activity (scheduled, revised and actual) so if a single task should finish late, dependent tasks will reschedule automatically. You can build a good level of control into your project by linking activities and creating dependencies between them. For example, if the start of an activity cannot begin until another activity has been completed the activities are dependent and should be linked. This can be done easily simply by joining the tasks graphically using the Draw Link Tool.

Fasttrack Schedule can also act like a spreadsheet to help track budgeted and actual cash flow, users can determine the Critical Path to identify the path of least flexibility for change, and data can be exchanged with spreadsheets, databases and other project management software including Microsoft Project.

Projects will typically sit on a server, with each Mac or PC Fasttrack Schedule user given read/write access as required. There's also a version available for the Palm to enable remote working. However, you don't necessarily have to buy multiple seats of the software to communicate data to everyone involved in the project. Fasttrack Schedule has a wide range of presentation tools and you can export schedules as pictures or HTML tables to be added to presentations or web sites. However, multi-user access via the application itself will provide project members with much more flexibility in how they view, and if required, update the data.

Conclusions

Fasttrack Schedule is a no frills package that provides a range of simple-to-use tools to plan, track and manage your projects. There are much more powerful and capable solutions on the market, but unlike these which often require bespoke implementations, you can get Fasttrack Schedule up and running in a matter of minutes, and from then on in it's incredibly easy to plan and maintain. For this alone Fasttrack Schedule demands close attention, particularly for those involved in small scale projects.

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Early for school

Construction giant, Mowlem put Autodesk Buzzsaw online collaborative project management solution at the heart of a £94 million Private Finance Initiative (PFI) project to design and build six schools in Exeter for Devon County Council.

Large construction projects bring together a diverse range of professions and people. A new-build school, for example, involves a complete cross-section of society from architects and bricklayers to teachers and school governors.

All team members and stakeholders need to be able to collaborate easily and quickly without having to cope with complex IT systems. They also need to know they are working on, or discussing, the most current information, otherwise their time has been wasted.

For this reason, construction giant Mowlem has put Autodesk Buzzsaw online collaborative project management solution at the heart of a £94 million Private Finance Initiative (PFI) project to design and build six schools in Exeter for Devon County Council. As a result, the projects are right on track. In fact, the first school opened a term early, five months ahead of schedule.

Timing is crucial

The PFI project involves the rebuilding of all the secondary schools in Exeter and one primary school. All of these are being built again from scratch on, or adjacent to, their existing sites.

The fact that Devon County Council is changing its approach by removing all middle schools has added a real urgency to the project. All the new schools need to be ready on schedule to facilitate this change.

The project began in 2003 and at once Mowlem recognised the need for a project collaboration solution: "We wanted a way of issuing information at speed. Drawings are really too large to email and you can never be sure they have been received. Photocopying and posting them is even less satisfactory and carries administrative overheads that accumulate to a hefty amount," says Bruce Badenoch, Mowlem's construction manager.

Ease of use was the main criterion when investigating the market. Badenoch recalls that the team looked at three different solutions, settling on Buzzsaw as the most straightforward, both to implement and to learn.

"We knew that on a project this size there would be a complete range of IT skills. We wanted to avoid a steep learning curve and to have the buy-in of everyone involved. We didn't want to give any member of the extended team a reason for not having access to vital information."

As a result, Autodesk Buzzsaw Professional is now being used across the entire Exeter PFI project in a number of ways.

Buzzsaw stores drawings and other project documents securely on an online site that is easy to access at any time by all authorised team members. All actions are logged, providing a complete audit of who has accessed what and when. In addition, automatic email notifications keep appropriate team members informed of important changes and updates. This core functionality provides a complete overview of where the project stands at any given time.

Badenoch says that this aspect of the service has proved popular with their client. "It leads to an open project environment which enables them to browse the site, in their own time, and see exactly what is happening and what stage we are at. Before this, all information was confined to one particular office - and was inaccessible to all but those who were working on it directly.

He adds, "Buzzsaw is also good for communicating designs and other project progress to a wider audience. Because of the redline mark-up facility, other interested parties can comment on the work, without changing the integrity of the design."

Mowlem also uses Buzzsaw as a procurement tool, posting tender information to five or six potential sub-contractors, giving them a secure area and set day on which to upload their bid return. "Once again this saves valuable time and proves a very efficient way of procuring contracts," says Badenoch.

He describes how Mowlem has generated even further value to the service by adding customised workflow including Requests For Information (RFI) and Change Order (CO) forms. "Autodesk sat with us and listened carefully about how we work. As a result, they have tailored our Buzzsaw site to include these forms."

Each of these forms has three or four stages and the workflow has been designed so that users can see at a glance the status of an RFI or CO. Only authorised users can process these forms - and Buzzsaw only allows this to happen if all these steps have been taken.

"This provides a transparent, self-checking process, eliminating much of the confusion that often surrounds COs in particular. As a result, the process is quicker and more efficient."

Widely used

"A project collaboration service is only as good as the number of people using it," says Badenoch. Using this measure, Buzzsaw must be very good indeed. He estimates that altogether around 800 people are using the Mowlem Buzzsaw site during the project, with an average of over 4,000 log-ins per month.

"I am actually amazed by how comfortable most people are with Buzzsaw – even those who have only ever used a home PC before," he says.

When it comes to cost-savings, there has been an obvious reduction in overheads through not having to print and courier documents. However, it's impossible to estimate the amount of time saved through having instant access to information and through eliminating mistakes that could have been made.

"We have a satisfied client and we look set to complete the total project within the deadline - so Buzzsaw has undoubtedly been worth the investment," he concludes.

www.buzzsaw.com



Workstation motherboards

Robert Jamieson

One of the most important components in your workstation is the motherboard. Robert Jamieson looks at the integrated technologies and what to look for when choosing a board for today and tomorrow.

Workstation hardware has some exciting components such as fast CPUs and big red graphics cards, but the humble old motherboard has a far greater influence over the performance and reliability of a system than people realise.

The earliest motherboards (sometimes called mainboards) were of course calculators and these developed into the first personal computer in 1972 with the Altar 8800 running at 200khz! There were other iterations before the Intel 8086 and AMD 8086 with 10bit buses appeared, and Bill Gates said that these systems, which carried 640KB memory, had enough memory for anybody! Motherboards mirrored processors with the 286 with 16-bit bus and then 386 with 32-bit buses. It's only recently that 64-bit and 128-bit buses have been implemented.

Motherboard technology

Chips: On a typical motherboard there are certain onboard chips which control different devices. The North Bridge chip talks to the CPU and memory i.e. the main control chip of a computer. The Motherboard will pick up its name from this chip - an Xpress 3200 from ATI or Intel 975, for example. The secondary "main" chip is the South Bridge and this can be from a different manufacturer, but it's uncommon in most modern motherboards. South Bridges control IDE devices, USB and parallel ports. In years gone, they caused havoc with hardware CAD dongles for products like AutoCAD.

A chipset designed today for an Intel CPU will not work on one designed for AMD. Each motherboard has a CPU socket, a 939 for example, which accepts a certain range of CPUs. There are many reasons why Intel and AMD are not cross compatible today but one reason is the use of memory (Intel and AMD were pin compatible in the 486 days).

Memory: Intel CPUs in workstations currently use DDR2 (Double Data Rate) memory with the memory controller external to the CPU. This gives the ability to change memory speeds without redesigning the Intel CPU. AMD has a certain advantage in that the memory controller is in the CPU, which gives a speed advantage even with slower (and cheaper) DDR1 memory, but they can't update it so quickly for new memory designs. With the advent of dual core CPUs where memory access to both cores is important, there seems to be an advantage in having the controller inside the CPU. AMD is likely to implement the faster DDR2 memory in a new socket called M2 later this year - still with the memory controller in the CPU.

Speaking of memory, it is important to have matched pairs i.e. two memory sticks the same to get the increased 128-bit wide interface. If you build your own systems you might see lots of "Dual Channel Kits" which is a little bit of marketing. So long as the memory is exactly the same in each bank it will work correctly. Of course you should always get a system with four sockets as a minimum and if possible two free sockets for later upgrades. For basic 2D CAD you need 1GB of RAM. For 3D modelling 2GB is a minimum, particularly as memory is relatively cheap.

PCI Express: The other important interface is the graphics one. All modern motherboards have PCI-Express. Some slightly older ones come with an 8x interface in a 16x connector. The current most popular single and dual sockets are 16x. The jury is still out on whether two graphics cards help design software at all but as I'm involved in one player I will let the MCAD labs come to the conclusions on CAD software as a whole. Even if the motherboard comes with two 16x PCI Express cards sockets you can still just use one. Currently aimed at games players the Radeon ATI boards work in ATI Crossfire and Intel dual PCI 16x boards. Nvidia Geforce graphics boards currently only work in SLI motherboards. In the workstation space the advent of new graphics engines by CAD software companies and OSs like Microsoft Vista might be needed before multiple GPU's (Graphics Processor Unit) give any real benefits to the CAD user, which is likely to be a few years away.

Integrated components: With the high integration counts of components, such as network devices and disk controllers, onto motherboards this has reduced the market for add in cards. This did start to some extent to graphic cards (not in the workstation market though) but with Microsoft Vista's increased graphics demands, there's likely to be an increased requirement for external graphics. All workstations have a dedicated, relatively high performing, graphics card already. A lot of stock integrated graphics cards on desktop boards on entry-level motherboards now have more powerful GPUs fitted as standard. Intel is now shipping a Radeon X300 as an integrated part in the Desktop Board D101GGC. The likely basic requirement for all systems will move up a step including workstations for graphics. Integrated sound cards are becoming very good and unless you have a special requirement they fulfil most workstation users' needs already.

A few years ago you could buy a system with a motherboard and hope to upgrade the CPU in six



months or a year to a faster one. Today with the changing technology in CPUs you generally have to change the motherboard at the same time. Once you need to change two major components it might be more cost effective to change the complete workstation.

Problems with motherboards

Problems with motherboards often manifest themselves with slow performance or graphics issues. This is generally due to the lack of a correct driver or the latest driver not being installed for the chipset. Windows, for example, has a list of most component drivers but often these are quite old. Most new workstations have later drivers available. Good system integrators (e.g. CAD2, Xworks, Armari) or OEMs know what to install. The problem is that company IT departments often install their own "image" and this sometimes renders the tuning of drivers back to the basic Windows set. The chipset drivers can stop other drivers working correctly so getting recent ones can fix loads of problems.

More serious issues can be solved by flashing (i.e. rewriting) the BIOS (Basic Input Output System) but (and this is a warning) can destroy the motherboard if it fails half way through the process. Changing the BIOS changes the fundamental running of a computer. Doing this has fixed IDE ports, new CPU support and crashing CAD software on some systems I've been involved with in the last few months.

When I was testing Windows XP x64 earlier last year I used good quality systems but a lot of other testers encountered problems due to lack of drivers for the OS or Microsoft had has of yet added support. Later this year Windows Vista will ship requiring similar good driver support. If you want to take advantage of the new OSs getting a quality Motherboard in your workstation is very important!

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The state of workstation graphics

This month Robert Jamieson heads back to home turf to look at the current state of the workstation graphics market and what the future holds.

Robert Jamieson

It's been an interesting last month in workstation graphics. With my company (ATI) introducing a new top end workstation card and 3Dlabs stating its withdrawal from the workstation graphics market place. Although not directly related I'm going to give my perspective on the factors that make these things happen in our industry.

As with any industry there are lots of companies vying for control of the market. As technology develops production costs increase and you end up with a small group of larger players.

If not by direct mergers the people in the graphics industry have all worked for different players. 3Dlabs had the Intergraph Wildcat team and is now owned by Creative Technology famous for its soundcards and now its MP3 players. Creative wanted to get into general performance graphics to compete with ATI and Nvidia and purchased the high end player 3Dlabs so that it could develop chips that could also be used in "consumer" graphics. The problem was 3Dlabs made high end performance cards for ultimate OpenGL performance using limited production runs GPUs (Graphic Processing Units) on physically large cards. But designing and making a GPU for mass production is a very different game and even in the interim Creative purchased GPUs from ATI and Nvidia to sell to consumer graphics customers. I guess this just didn't help the bottom line for 3Dlabs.

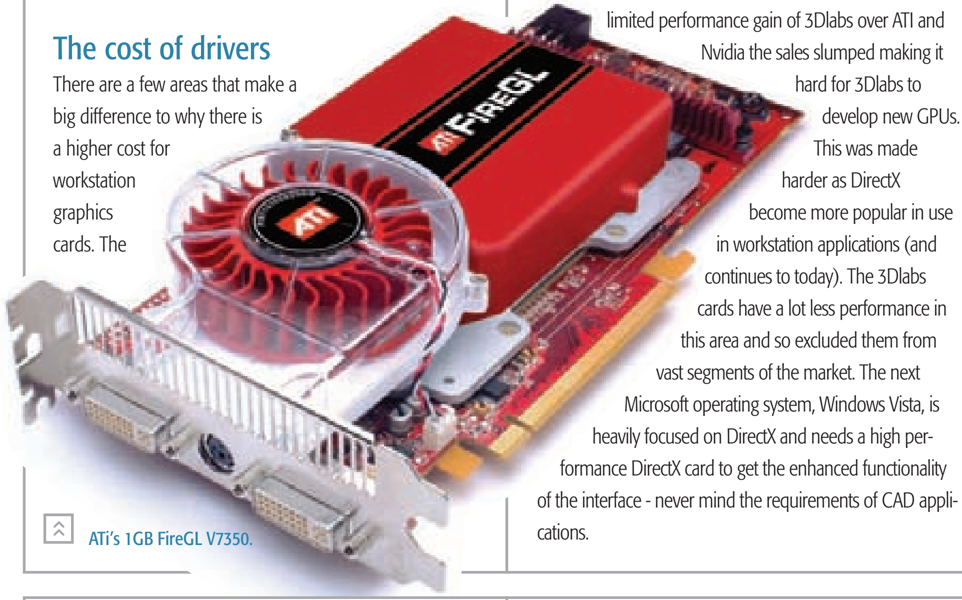
The cost of drivers

There are a few areas that make a big difference to why there is a higher cost for workstation graphics cards. The driver has to be tested by the ISV (Independent Software Vendors, such as Autodesk, Dassault etc) to prove it works to their standards and ensure any bugs are fixed. These drivers optimise the performance so that the card is faster in the application and because of the testing they are more reliable. The ongoing support costs for workstation cards are quite high in terms of manpower as workstation graphics card vendors also have to develop drivers for future applications not yet written. Inventor 12 and Solidworks 2008 are currently only a twinkle in their developers' eyes but when they come out they will have to be supported on graphics cards that were shipped long ago.

Graphic interfaces and content is constantly changing in CAD so this is not an easy task. With ATI and Nvidia having a larger market share we have contact with more customers and therefore fix more bugs. This translates to reliable performing drivers. This generally means good customer experience (there will always be an exception) which is important for repeat business. This is something that reduces as your user base shrinks.

The extra money a larger user base brings in means you can spend more on driver development. Take our new cards, for example. The performance is good now but six months down the line it will be better as we invest time and money to improve this with optimisations for each application.

As the gap widened between high price and limited performance gain of 3Dlabs over ATI and Nvidia the sales slumped making it hard for 3Dlabs to develop new GPUs. This was made harder as DirectX become more popular in use in workstation applications (and continues to today). The 3Dlabs cards have a lot less performance in this area and so excluded them from vast segments of the market. The next Microsoft operating system, Windows Vista, is heavily focused on DirectX and needs a high performance DirectX card to get the enhanced functionality of the interface - never mind the requirements of CAD applications.



ATi's 1GB FireGL V7350.

> Because the two main players ATI and Nvidia are going head to head, users are safe. Constant competition guarantees good value and repeated innovation.

The new generation

The workstation market grew quite a bit last year, not only in this country, but worldwide as more people recognise the advantages of good performance and the benefits of supported graphics. Now, the two main players in volume are ATI and Nvidia and because there are two companies going head to head the users are safe. Constant competition guarantees good value and repeated innovation. Once one comes out with a new better solution, currently ATI's FireGL V7350 with 1GB of frame buffer, you can guarantee the competition will try and come out with something to compete with it sometime soon.

So why do we need all this RAM on a graphics card? I am not saying a card like the V7350 will give improvements to all CAD and visualisation applications today but for certain high-end requirements, such as in medical imaging, this is a requirement. Also DCC (Digital Content Creation) applications like 3ds Max can cache large datasets into this frame buffer (or by default when using DirectX mode) so that it improves the frame rate (rotational performance). This is also linked to the time it takes to zoom in and out. On a large model do you really want to waste time waiting for this? With the other CAD vendors implementing this functionality to exactly get these benefits. I imagine cards with more RAM will become increasing popular once the memory limits have gone when 64-bit computing becomes the norm. For people on a tighter budget the V7300 has "only" 512Mb which is easier on the pocket but gives the same base performance.

The future

I have talked recently about more computing functions being placed on GPUs as the current GPUs are an array of little processors. Once applications become available which support these functions more directly and Operating Systems like Vista have this functionality built in, GPU choice will become as important as CPU choice.

Microsoft Windows has produced a document on the minimum requirements for "Premium" Windows Vista to support the Aero interface. The main crux of this is that you need a dedicated graphics card with at least 128MB of RAM (not shared memory) to run at a resolution of 1,600 x 1,200 with 32-bit per pixel. DirectX 9 support with Shader Model 2 and a texture bandwith of 2GB/second. All FireGL cards from the last two years, with the exception of the FireGL T2s (half height) support this requirement.

In summary, this is likely to be a good year for graphic card vendors with the increasing reliance on 3D applications, not only in CAD, but for file viewers. Windows Vista and the competing Operating Systems with 3D interfaces will also play a major role.

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